GENERAL INFORMATION

ARCHIVES OF PHYSICAL THERAPY, X-RAY, RADIUM

Original contributions, exchanges and books for review should be forwarded to the Editorial Office. All business matters incuding advertising should be handled through the Executive Office, Suite 716 — 30 N. Michigan Ave., Chicago, Illinois.

The statements in the manuscripts published in the Archives of Physical Therapy, X-Ray, Radium, are made solely on the responsibility of the author. The American Congress of Physical Therapy does not assume any responsibility for statements contained therein. Manuscripts accepted for publication in Archives of Physical Therapy, X-Ray, Radium, are for exclusive publication and may not be published elsewhere.

Subscriptions—In the United States, its possessions, and Mexico, $5.00 yearly; Canada, $5.50; elsewhere, $6.50 the year.

Advertising rates on application. All advertising must conform to American Medical Association Rules.

Published monthly at Chicago, Illinois, by American Congress of Physical Therapy.

Entered as Second Class Matter June 2, 1930, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879.

DISRAELI KOBAK, M.D., Editor

Suite 716 — 30 North Michigan Avenue, Chicago, Illinois

OFFICERS AND BOARD OF GOVERNORS

AMERICAN CONGRESS OF PHYSICAL THERAPY

ROY W. FOUTS, M.D., Omaha, President.
F. H. EWERHARDT, M.D., St. Louis, President-Elect.
GUSTAV KOLISCHER, M.D., Chicago, First Vice-President.
L. A. TARBELL, M.D., New Haven, Second Vice-President.
J. S. HIBBEN, M.D., Pasadena, Third Vice-President.
FREDERICK H. MORSE, M.D., Boston, Fourth Vice-President.
F. L. WAHRER, M.D., Marshalltown, Ia., Secretary.
J. S. COULTER, M.D., Chicago, Treasurer.

PUBLICATION COMMITTEE

DISRAELI KOBAK, M.D., A. R. HOLLENDER, M.D., ALBERT F. TYLER, M.D., HAROLD SWANBERG, M.D., JAMES C. ELSOM, M.D.

CONTENTS—DECEMBER, 1930

VOLUME XI, No. 12

ORIGINAL ARTICLES

Radiation Treatment of Cancer of the Uterine Cervix....A. F. Tyler, B.Sc., M.D., F.A.C.P. 649
Pelvic Diathermy....George Gellhorn, M.D., F.A.C.S. 654
Ultraviolet Radiation in the Management of Corneal Ulcers....O. B. Nugent, M.D. 660
Medical Diathermy in the Treatment of Hemorrhoids....Disraeli Kobak, M.D. 665
The Colon: A Factor in Disease....Harry W. Rotham, M.D. and O. Boto Schellberg 668
Combined Diathermy Apparatus and Treatment Table....Norman E. Titus, M.D. 674

EDITORIALS

The Spirit of Research.... 678
Modern Treatment of Corneal Ulcers.... 679
Laryngeal Tuberculosis with Special Reference to Ultraviolet Therapy.... 681

SPECIAL SECTION

Queries and Clinical Notes.... 683

PHYSICAL THERAPY CLINICS

Ultraviolet Prophylaxis....Albert Bachem, Ph.D. 686

CURRENT NEWS AND COMMENT

Miscellaneous Items of Interest.... 688

THE STUDENTS' LIBRARY

Book Reviews.... 691

INTERNATIONAL ABSTRACTS

Abstracts of Articles on Physical Therapy, X-Ray, Radium, Biophysics and Allied Subjects.... 693

INDEX

Volume XI, January-December, 1930, Inclusive.... 699

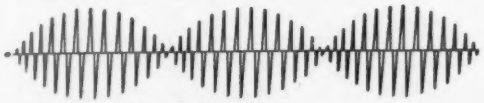
The McIntosh Polysine Generator No. 1258

Trade Mark Reg. U. S. Pat. Off.
Patented June 17, 1930.
U. S. Pat. No. 1,764,347.
Other Patents Pending.

FACTORY BRANCHES
BOSTON, NEW YORK,
FORT WORTH, SEATTLE

How Should Impaired Musculature Be Rehabilitated?

Clinical records support the claim that the proper application of low voltage current affords quicker relief and ultimate restoration commensurate with normal function than other usual measures in treating patients suffering from weakened atrophied muscles, paralysis, nerve injuries, intestinal stasis, ptosis, etc.



OSCILLATORY WAVE

The NEW OSCILLATORY CURRENTS generated by the No. 1258 McIntosh Polysine Generator add even greater value to this treatment — AFFORDING DEEP NEURO-MUSCULAR RESPONSE AND STIMULATION WITH EASE AND COMFORT TO THE PATIENT. Continued low tension treatment of impaired muscular physiology with the new Polysine currents will show definite relief and improvement in most cases, with normal function restored as nearly as possible.

MAIL THE COUPON
FOR FURTHER DETAILS

McINTOSH
ELECTRICAL CORPORATION-CHICAGO

232 N. CALIFORNIA AVE.

Gentlemen: Send me without obligation on my part your bulletin, "New Oscillatory Currents for Low Tension Tehnique"; also send details on your easy purchase plan for the New Polysine.

Name .....

Address .....

.....

A.P.T.X.

PHYSICAL THERAPY

At a Glance on the New

Bachem - Kobak

PHYSICAL THERAPY CHARTS

Including X-Ray and Radium

These charts are designed for study of details and principles; **demonstration** of physiotherapy to specialists, general practitioners, technicians, nurses; **teaching** to students, nurses, technicians; **practical application** as to indications, contra-indications, treatment methods, dosage, etc.

A Lexicon Ever Ready for Instant Use

The charts, six in number, are about 30x40 inches in size and cover the entire range of physiotherapy from biophysical foundations to the therapeutical application.

SOLD BY

RADIATION PUBLISHING CO.

1337 Winona Street CHICAGO, ILL.

RADIATION TREATMENT OF CANCER OF THE UTERINE CERVIX *

A. F. TYLER, B.Sc., M.D., F.A.C.P.
Professor of Radiology,
Creighton University, Medical Department
OMAHA, NEBRASKA

Radiation treatment has been employed long enough that technic is pretty well standardized and the pathology well understood. Statistics are now available showing what can be accomplished by this method of treatment. Reports of large series of cases which have been accurately worked up, scientifically treated and closely followed five years or more after treatment, make these statistics as reliable as any to be found where other methods of treatment have been used. As a result the field for radiation therapy is well defined, the results can be accurately forecast and comparisons made with other methods of therapy.

Method of Examination

Personal observation leads me to think there are some simple methods of examination which greatly aid in the diagnosis which are frequently neglected by the physician who first sees the patient. We know that many patients do not come to the physician as soon as they should. In fact, more than 60 per cent of patients [1] do not come until they have reached the inoperable surgical stage. On the other hand, many patients go to the physician at the first warning sign and are treated for this and for that without being carefully examined. It seems, then, that the patient needs to be taught the "early danger signs" and the necessity of finding out what they mean. The physician, on the other hand, needs to learn the necessity of careful physical examination in all cases where "danger signs" have appeared.

It is not sufficient to make only a bimanual pelvic examination because there are many signs which must be seen rather than felt. I want to emphasize the necessity of looking at the external genitalia, then introducing a speculum so that the urinary meatus, the vaginal canal, and the uterine cervix can be seen. While the speculum is in place it is exceedingly important to determine whether blood is coming from an ulcer on the vaginal surface of the cervix or whether it is coming from the cervical canal. If it is proven to come from the cervical canal then one must determine whether the source is in the cervical canal itself or in the uterine canal.

A small per cent of cancers of the cervix arise from the epithelial lining of the cervical canal. This particular type extends through the lateral portion of the cervix and very early invades the wall of the bladder or the wall of the rectum. Ewarts Graham [2] has emphasized the necessity of searching for this type of cancer of the cervix and advocates lifting the bladder wall and incising the anterior lip of the cervix longitudinally so as to be able to inspect the entire canal. Of course this procedure can only be supplementary to the office examination.

At the office, however, careful inspection should first be made followed by palpation, not only through the vaginal route but also by digital examination through the rectal route. Much information will be obtained by palpation through the rectum which can be determined in no other way. Every physician is familiar with the classical case of cancer of the cervix so that the problem is one of searching carefully rather than failing to recognize the disease when it is seen.

Pathology

The great majority of cancers of the vaginal surface of the cervix uteri are of the epidermoid type. Two hundred nineteen were of the epidermoid type and 34 of the adenocarcinoma. In the 253 cases reported by Norris [3], the squamous cell variety was found most often with basal cell less frequently. Adenocarcinoma is found in the cervix also but not so frequently as the epidermoid type. Clinical examination alone will not enable one to tell to which class the particlar case belongs. This information can only be obtained by biopsy.

Broders [4] has aided greatly in our knowledge of prognosis in cancers by his method of grading them 1, 2, 3 and 4, according to the degree of differentiation of cells. Grade 1

* Read before the Ninth Annual Meeting of the American Congress of Physical Therapy, St. Louis, Mo., September 9, 1930.

represents those growths having 100 to 75 per cent of their structure differentiated epithelium. Grade 2 includes those growths where the differentiated portion ranges from 75 to 50 per cent. In grade 3 the differentiated epithelium makes up 50 to 25 per cent of the mass. In grade 4 there is little or no tendency of the cells, (25 per cent to nothing), to differentiate. So far as prognosis is concerned grade 1 is the least malignant while grade 4 is the most malignant type.

Ewing [5] has classified tumors of all kinds according to their radioresistance. He says, "Carcinomas are resistant in inverse proportion to the degree of anaplasia and in direct proportion to the amount of desmaplastic reaction which they excite." He believes that all tumors should be graded according to their radiosensitivity.

Clinical Groups

For purposes of treatment it is advantageous to divide cancers of the uterine cervix into certain groups. The division advocated by Burnam [6] has proven valuable to me.

1. Small cancers confined entirely to the cervix.
2. Cancers of the cervix which have extended onto the vaginal wall.
3. Cancers of the cervix which have extended into the parametria (broad ligaments, vesicovaginal septum or rectovaginal septum).
4. Cancers of the cervix which have metastasized to distant parts (periiliac or periaortic glands, to bone, etc.).

After one has determined by biopsy into which of Broder's classifications the growth falls and by physical examination has learned in which of Burnam's classifications it is, the prognosis and method of attack can be accurately outlined. For example; if the growth was a small malignant ulcer, grade 1, confined to the cervix the prognosis would be favorable and the method of treatment different than if the growth were grade 4 and had already extended into the periaortic glands or the bones of the pelvis.

Contra-Indications

Certain conditions may be present in a given patient which definitely exclude the use of radiation treatment. The greatest contra-indication to radiation is the presence of pelvic infection (pus tubes, cellulitis, etc.) in a patient suffering at the same time from cancer of the cervix. Belugin [7] states that out of 22 fatal cases of carcinoma of the uterus, treated with radium, in 16 instances death was due to peritonitis or to general septicemia. Necropsy showed in over half of the cases destruction of the capsule of a purulent focus localized in the small pelvis, the destruction being due to the chemical and biological action of the irradiations.

Stacy [8] calls attention to the development of pelvic infection during the radiation treatment. She recommends immediately stopping further treatment until all signs and symptoms of infection have subsided. The treatment should be abandoned if the patient fails to react favorably.

There is always a certain amount of infection in cancers of the cervix especially where they are large and cauliflower like. These patients carry a low grade temperature and leucocytosis, both of which increase immediately after radiation but which quickly subside especially where free drainage is kept up by frequent douching. This type of infection is unavoidable and need not deter the use of radiation in the treatment of the cancer.

Regaud [9] citing the experience at the Paris Radium Institute, says "—— surgical treatment should be applied in cancer coinciding with infection of the adnexa and in cases rebellious to radiotherapy."

Indications

There has been no question at any time since radiation therapy was introduced about the inoperable patient. This class has always been helped by x-ray or radium or by a combination of the two. It took more time, however, to prove the value of radiation in the operable cases. Statistics are now available which clear the atmosphere. Regaud [9] says, "Radium alone is indicated in cancer of the cervix with parametrium intact. Roentgen ray alone is the method of choice in inoperable cases in which the correct use of radium is not practicable, and also for recurrences after hysterectomy. Association of roentgen ray with radium is suggested if the parametrium is affected but still accessible to radium."

Ward [10] says: "All borderline cases fall within the range of radium and not operation."

Bowing [11] agrees with both these authors reserving for surgery only those cases where the cancer is confined to the cervical canal. All others are preferably treated by radiation.

Radiation Treatment

Radium Alone.

It has been well established by the users of radium that Burnam's class 1 and class 2, cancers of the cervix, are best suited to treatment by radium alone. Where the cancer is confined entirely to the cervix or is beginning to spread to the vaginal wall either in the vault or at the point of contact of the cervix and the posterior wall, radium is the method of choice. In these two classes the application of radium can be made without any anesthetic or in the exceptional case by transsacral anesthesia, thus avoiding the dangers of general anesthesia. Moreover in these two classes the radium can be placed in direct contact with the growth thus getting the dosage at the site where most needed. Since these types of cancer are local in character a massive local dosage directly to the cancer area with milder dosage to the surrounding tissues meets the ideal of therapy.

This method of treatment is apparently so simple that a word of caution is advisable. The most meticulous care must be exercised to apply the radium applicator to the site of the cancer so as to radiate not only the ulcer area but sufficient area around it to catch all cancer cells in the bordering zone. Not only must the application be carefully done but a method must be devised to retain the applicator fixed during the time of treatment.

Where the applicator is applied in the cervical canal it is necessary to put a suture through the lip of the cervix and through the hole in the proximal end of the applicator. This is tied and prevents expulsion of the applicator from the cervical canal during urination, defecation, uterine contractions and movement of the patient in bed. After suturing the applicator in place, the vagina must be carefully and snugly packed in such a manner as to push the rectum and bladder as far away from the radium as possible. The rectal mucosa is exceedingly sensitive to radiation, much less than the "carcinoma dose" causing ulceration and sloughing. Neglect to protect it causes much post-irradiation suffering and even may produce recto-vaginal fistula. The position recommended several years ago by H. H. Bowing is the only satisfactory way of applying radium to the cervix. He puts the patient in the knee-chest position. As soon as the speculum is inserted air fills the vagina, the abdominal viscera fall down and a perfect view of the entire vaginal canal and cervix is possible with all folds obliterated and the cervix in the center of the vault. The radium applicator can be slipped into the cervical canal and the packing done with the greatest ease. Only in the exceptional case should the dorsal position be used.

In the technique recommended by Regaud the uterine applicator has a broad base with space to house radium on either side of the center. By this method radium is placed both in the cervical canal and against the lips of the cervix at the same time. In class 2 where the vaginal vault is invaded he adds a capsule in each lateral vaginal fornix. This gives complete crossfire effect on the cervix and gives additional radiation into the parametria. These two capsules must be retained by a special instrument called by him a "colpostat." (Figure 1.)

Fig. 1. Drawing showing the crossfire method devised by Regaud at the Curie Institute, Paris. Note the radium in the cervical canal, against the end of the cervix and in the lateral fornices. This gives massive radiation of the cervix and less intense dosage to the parametria.

In other cases hollow needles containing either radium element or radon can be used to advantage inserted directly into the tumor mass. A more intense local effect is obtained by this technique.

In institutions where large quantities of radium (several grams) are available the application may be made externally through multiple ports of entry using the technique employed in x-ray treatment. Regaud [12] recommends this method as does Fricke [13] and others.

High Voltage X-Ray

In Burnam's class 3 and class 4 where the cancer has invaded the parametrium and lymphatic glands around the iliac arteries or the aorta, high voltage x-ray is the method of

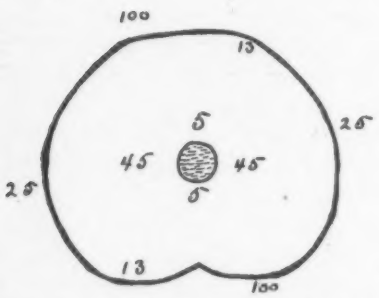


Fig. 2. Drawing showing crossfire method used in high voltage x-ray therapy using multiple skin areas but focusing on the uterus, thus, building up the "carcinoma dose" in the cervix. This same method is followed when large quantities of radium are used externally. The numbers indicate the various percentages on the skin surface next to the x-ray tube in the uterus and on the opposite skin surface.

choice. (Figure 2.) The distribution of dosage through the entire pelvic area can be made homogeneous by the proper use of high voltage x-ray. Although the physical principles underlying this method of treatment have been known for more than ten years they seem to be poorly applied by many using this method. Unless properly applied, high voltage x-ray is a dangerous agent and may result in overdosage in the thin patient and underdosage in the thick patient.

The particular machine in use must be calibrated by a physicist who is familiar with this work and who has the necessary instruments so that the output of x-rays coming from the x-ray tube to the patient is definitely known. Knowing this, the dosage must then be carefully estimated for each patient before starting the treatment. It is also helpful to measure the dosage during the treatment of each patient. (Figure 3.) By using multiple ports of entry on the skin the "carcinoma dose" can be given to the involved area without causing more than a tanning of the skin. In more recent years the valve tube type of machine has been perfected so that dosage is much more accurate than with the mechanical type of rectification. It is not only more accurate but can be given in shorter time and

Fig. 3. Drawing of high voltage x-ray machine using valve tube rectification which is the most modern development in x-ray therapy.

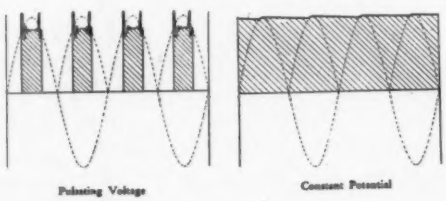


Fig. 4. Drawing showing the difference in the type of x-ray wave from the mechanically rectified and valve tube rectified machine. The drawing also shows the reason why the treatment time is greatly lessened where the valve tube rectification is used since more x-ray enters the patient's body in a given time than with the mechanical rectification.

with practically no constitutional effects to the patient. (Figure 4.) The quality of the rays produced by valve tube rectification is also better suited to deep treatment so that the improvement is greater and end results better in patients thus treated.

Results

Healy [14] reported 224 cases of cervical cancer of all classes treated during the years 1922 and 1923, early 60 per cent alive; borderline 37 per cent; advanced 23 per cent.

Heyman [15] says that in comparing the results of operable cases treated surgically with those treated by radiation one should bear in mind:

1. That the result with radium treatment is obtained at the expense of a very small primary mortality. They have lost through peritonitis or sepsis a total of 6 in 505 cases, that is 1.2 per cent.

2. That in a considerable number of inoperable cases (1914-1918—30 cases out of 181 or 16.6 per cent) clinical healing resulted and persisted for at least five years.

3. That of the remaining inoperable cases nearly 20 per cent and in some years more than 25 per cent have still been symptom free three years after the beginning of the treatment.

4. That in the majority of treated cases even though a complete absence of symptoms has not been secured, a more or less lasting

improvement has been obtained with a corresponding benefit to the patient.

5. That the radiological method of treatment probably has great possibilities of further development. However, it must be emphasized that good results with radium treatment, just as with surgical treatment, can be attained only by a study of the patient, and proper knowledge of the limitations of the form of treatment and carefully planned technic and experience. In the hands of the inexperienced the method involves added risks without any chance of results comparable to those secured with operation.

Schmitz [16] reports 151 cases of carcinoma of the cervix of all classes treated by combined radium and x-ray with the following results after five years: Primary carcinoma 14.2 per cent, recurrent carcinoma 4.5 per cent alive and well.

Lahm [17] reports 469 cases of carcinoma of the cervix of all classes treated 1915-1923 with the following percentages well after five years. Class 1, 40.7 per cent; Class 2, 31.2 per cent; Class 3, 17.1 per cent; Class 4, 2.6 per cent making the five year results for all classes 23.5 per cent.

Berven and Heyman [18] report 1584 cases of cancer of the uterine cervix treated at Radiumhemmet, Stockholm, 1914 to 1929 inclusive, with 30 per cent symptom free after three years and 23.6 per cent after five years.

References

1. Radium Treatment of Cervical Cancer, G. E. Ward; **19:**330-334, 1928, *Am. J. Roentgenol.*
2. Surgical Diagnosis, Ewarts Graham; **11:**34, 1930, W. B. Saunders Co.
3. Carcinoma of the Cervix, C. C. Norris; **6:**112-113, 1926, *S. Clin. N. Am.*
4. Carcinoma: Grading and Practical Application, A. C. Broders; **2:**376-381, 1926, *Arch. Path. & Lab. Med.*
5. Factors Determining Radioresistance in Tumors, James Ewing; **14:**186-1930, *Radiology.*
6. Results of Treatment of Carcinoma of the Cervix with Statistics and Technique, Curtis F. Burnam; **9:**765-771, 1922, *Am. J. Roentgenol.*
7. Mortality in Radium Therapy of Uterine Cancer, Owing to Abscesses in Small Pelvis, I. Belugin; *Zentralbl. f. Gynak,* **48:**1970-74, 1924; *Abst. J. A. M. A.* **83:**1210, 1924.
8. Complications Following the Application of Radium to Pelvic Lesions, Leda J. Stacy; **19:**323-327, 1928, *Am. J. Roentgenol.*
9. Treatment of Cancer of Uterine Cervix with Radium; Statistics of Radium Institute in Paris for 1919-1923; present status of therapeutic indications, (C. Regaud, A. Lacassagne, J. Roux-Berger, H. Coutard, O. Monod, J. Pierquin and Richard) *J. de radiol. et d'electrol,* **9:**561-563, 1925; *Abs. J. A. M. A.* **86:**1487, 1926.
10. Radium Therapy of Cancer of the Uteri: 10 Years of Clinical Experience and Results at Woman's Hospital, G. G. Ward; **17:**1-13, 1929, *Am. J. Obst. & Gynec.*
11. Carcinoma of the Cervix and Fundus Uteri Treated by Combinations of Surgery, Radium and Roentgen Ray, H. H. Bowing; **6:**487-492, 1926, *Radiology.*
12. Treatment of Cancer of Uterine Cervix by External Foci of Radium at Distance; Technic and First Results, R. Ferroux, O. Monod and C. Regaud, *J. de radiol. et d'etelectrol,* **10:**21-23, 1926; *Abs. J. A. M. A.* **86:**1487, 1926.
13. Radiation Therapy in Carcinoma of the Uterine Cervix, R. E. Fricke; **7:**189-195, 1926, *Arch. Physical Therapy.*
14. End-results of the Treatment of Cervical Cancer by Radiation, W. P. Healy; **16:**594-599, 1928, *Am. J. Obst. & Gynec.*
15. Final Results in Radium Treatment of Carcinoma of the Cervix Uteri at Radium Home, Stockholm, Sweden, H. Heyman; **40:**161-164, 1925, *Surg. Gynec. Obst.*
16. The Treatment of Inoperable Cervical Carcinomata with Measured Doses of X-rays and Radium based on Microscopic Examinations—Five Year End-Results, H. Schmitz; **9:**644-658, 1925, *Am. J. Obst. & Gynec.*
17. Die Dauerheilung des Collumkarzinoms bei Radium—und kombinierter Radium-Roentgenbestrahlung, W. Lahm; Chemnitz. B:I, 18. *Abstracts of Communications, Second International Congress of Radiology, Stockholm,* 1928.
18. Cancer of the Uterine Cervix Treated at Radiumhemmet, Stockholm, E. Berven and James Heyman, 78, 1929, Berattelse from Styrelsen for Cancerforeningen i Stockholm.

PELVIC DIATHERMY *

GEORGE GELLHORN, M.D., F.A.C.S.

ST. LOUIS, MO.

The results obtainable with diathermy have been subjected to considerable discussion. There are some who pronounce them wholly imaginary while others, equally uncritically, claim that they have cured almost any ailment with this method. Even those whose judicious attitude and personal experience entitles them to earnest consideration, feel that "it is impossible to focus the site of heat in any given internal viscus" (Bettman & Crohn, J. A. M. A., 1927, 88:5321), or entertain "grave doubt" as to "the possibility of raising the temperature 5 to 10 degrees" (Scheffly & Schmidt, *A. J. Obst. & Gyn.*, 1929, 18:230).

Yet, the production of a high degree of heat in a given location within the body constitutes the very nature of diathermy. Therein lies its essential difference from either contact or radiating heat, both of which are applied *from without*. A high frequency current of low voltage, by passing through the body or certain parts of it, transforms its electric energy into heat because of the resistance of the living tissues. The localization of heat is determined by the uneven size of the electrodes, which varies inversely with the size of the electrodes. It thus heats the tissues, particularly in the neighborhood of the smaller electrode, where the current converges and becomes more dense.

This can best be demonstrated in gynecological diathermy where the outer or "indifferent" electrode of block tin is placed around the waist of the patient while the smaller electrode is inserted into the vagina. Of the various models, I have found the Chapman vaginal electrode particularly useful because it snugly surrounds the cervix and completely fills the vaginal fornices. It is an extremely simple matter to prove that the electric current produces considerable heat and that the highest degree of heat is localized in the uterus and its immediate vicinity. It is only necessary to place a thermometer into both bladder and rectum during the abdominovaginal treatment to prove that a rise of temperature can be definitely produced. I have done this systematically in a large number of cases. I have also carried out these experiments in different hospitals so as to check up my findings, and though the maximum temperature varied somewhat with different makes of diathermy apparatus, the ratio between the temperature in the vagina and that in bladder and rectum, respectively, was practically the same. As an illustration, I submit the following report of separate experiments (Table I) done on a group of patients.

Table I

Diathermy (Vaginal).

Treatment No. I.		TEMPERATURE *		
Time	Milliamperes	Vaginal	Rectal	Vesical
11:35	1500	102°F.	101²F.	100°F.
11:40	2500	106°F.	105⁴F.	104 F.
11:45	3000	108°F.	107²F.	106²F.
11:50	3000	110°F.	109°F.	108 F.
11:55	3200	110°F.	109²F.	108 F.

Treatment No. II.		TEMPERATURE *		
Time	Milliamperes	Vaginal	Rectal	Vesical
11:25	2400	106°F.	105²F.	104 F.
11:30	2500	108°F.	106²F.	105 F.
11:35	3000	110°F.	107⁴F.	106²F.
11:40	3000	110°F.	108°F.	107 F.
11:45	3200	110°F.	109°F.	108 F.

Treatment No. III.		TEMPERATURE *		
Time	Milliamperes	Vaginal	Rectal	Vesical
2:50	1200	103°F.	100°F.	99°F.
2:55	1500	106°F.	103°F.	102 F.
3:00	2000	108°F.	104⁴F.	103²F.
3:05	2500	110°F.	106°F.	105 F.
3:10	2500	110°F.	109⁴F.	106°F.
3:15	3000	112°F.	110°F.	109 F.

* Note. No temperatures were recorded until the patient had been under treatment for ten minutes.

This table, in my opinion, is very instructive. It proves at once that it is possible to raise the temperature in the pelvis 10 or more degrees, to maintain it at this level and to focus the heat within the uterus and parametria. Herein the peak of the heating process is located. The adjoining organs, though their actual distance is hardly more than 2 or 3 cm., the temperature, on an average, is 1 or 2 degrees lower than in the center. The difference is more marked in the bladder, because the urine with its salts acts as a good conductor for high frequency current.

Even if the apparatus at present on the market was able to produce a temperature of 115° F. in the region of the vaginal electrode, it was considered inadvisable to exceed 112° F. for fear of injuring the living cells. This degree of heat was quite sufficient to produce a distinct sensation of internal warmth which, in some cases, even led to profuse external perspiration. The part of the body, on the

* Read before the Ninth Annual Meeting of the American Congress of Physical Therapy, St. Louis, Mo., Sept. 8, 1930.

other hand, which was covered by the outer, indifferent electrode, was neither reddened nor heated.

The heat created in the organs and tissues of the pelvic cavity primarily acts as a stimulant upon the vasodilator nerves within the affected zone. As a result, the blood vessels dilate and a large volume of fresh arterial blood is brought to this region. This serves, in the first place, to cool the tissues and prevent burns and, secondly, to wash away the accumulated waste products of former inflammations. The local metabolism which had been retarded by the existing pathological condition, is thereby restored more nearly to the normal. The new blood may, according to Scheffly and Schmidt, bring additional leucocytes and antitoxins with it and neutralize bacterial poisons. Absorption and elimination are increased, and in consequence of this process, a profuse, watery discharge is frequently seen to appear after each treatment. The relief from pain is prompt and this may be attributed to the fact that venous stasis is reduced and pressure on the nerve ends is checked. The relief from pain in most cases is an impressive phenomenon.

The possibility, then, of creating internal heat within the pelvic organs, and thereby inducing a powerful arterial hyperemia in these structures points to diathermy as a promising method of treatment of pelvic inflammatory disease and superior to other forms of heat application. I have elsewhere made mention of similar convictions (*J. A. M. A.* 1928, 90:1005) wherein I discussed this phase of the question at length.

I cannot, however, leave the subject without pointing out the limitations of this form of therapy. The possessor of a diathermy apparatus should bear in mind that heat and hyperemia are powerful agents, which may be as harmful as they are beneficial if not used judiciously and in moderation. Therefore, he should be absolutely certain of his diagnosis before using diathermy—even if it should require consultation with a gynecological expert. A painful swelling on bimanual examination is, in itself, not a sufficient indication. To mention but one possibility, he may be dealing with an ectopic pregnancy in which diathermy would surely hasten the occurrence of rupture. Other complications, such as fibroids, may also be present, and it is well to remember that induced hyperemia might provide increased bleeding. On account of this artificial hyperemia, too, an impending menstruation would contraindicate diathermic treatment for the time being.

The stage of the pelvic inflammation also demands attention. In the acute and early subacute stages, diathermy cannot be employed. Even in later stages the treatment should always be initiated with due caution. A rising fever or an increase in pain should be an index to a temporary discontinuation of the treatment.

Treatment should not be over intensive or long in duration. The average length of treatment should be about thirty minutes and the sensation should be that of pleasant warmth. If carried beyond this point the vasodilator nerves may become paralyzed by the heat, and the result would be a venous stasis, rather than an arterial hyperemia.

In the enthusiasm over a new therapeutic agent, one is apt to forget other tried methods of treatment. It behooves us to make use of all other therapeutic means which have stood the test of time. Above all, the physician must never lose sight of the fact that restitution from an inflammation requires TIME, and that no method however beneficial and ingenious, leads to that short cut to health that every patient hopes for in her own case.

With all these restrictions in mind, one may propose a simple scheme to be followed in the treatment of pelvic inflammations which may be altered or elaborated according to individual experience.

Acute Stage

Rest
Fresh Air
Diet and elimination.

Subacute Stage

Rest
Protein Therapy
Diet and elimination
Later, diathermy (cautiously!)

Chronic Stage

Protein Therapy
Diathermy—alternating with
Firm packing of vagina with glycerine tampons.

If carried out patiently and conscientiously, the management of pelvic infections will yield, in the great majority of cases, highly satisfactory results. It will also eliminate, to a large extent, operative procedures which seem to me

wholly unphysiological and often unnecessarily mutilating.

Heat in degrees sufficient to kill bacteria, cannot be used in the human body. The only exception is in the case of gonorrheal infection, because we know that gonococci are highly susceptible to heat and, in the test tube, are killed at a temperature of 108°F. In the living, the degree of heat must be considerably higher because the human organism is always intent on maintaining a medium and constant temperature in all organs. As soon as the temperature rises too much in any one place, fresh cooling blood is despatched to the heated zone to prevent accumulation of heat and consequent burn. The careful work of Corbus and O'Conor ("Diathermy," *Bruce Publishing Co.*, 1925,) has demonstrated that gonococci which may lurk indefinitely in the ducts of Skene, responsible for most cases of recurrent infection, can be killed by means of diathermy. Several foreign authors (von Buben, van Putte) have likewise reported signal successes. My personal experience is limited to 4 cases; of this group 3 had resisted all therapeutic efforts except diathermy. With this agent they were promptly and permanently cured by urethral and intracervical diathermy.

I append a table showing the temperatures obtained in one of the successful cases.

Table II

Internal Diathermy (Urethral).

Treatment No. I.		TEMPERATURE		
Time	Milliamperes	Urethral	Vaginal	Rectal
10:30	400	108°F.	103°F.	100°F.
10:35	600	110°F.	104°F.	100°F.
10:40	700	112°F.	105°F.	101°F.
10:45	750	112°F.	105°F.	101°F.
10:45	Temperature continued for ten minutes.			

Treatment No. II.		TEMPERATURE		
Time	Milliamperes	Urethral	Vaginal	Rectal
11:12	275	104°F.	104°F.	100°F.
11:17	300	106°F.	105°F.	100°F.
11:22	400	106°F.	105°F.	100°F.
11:27	500	110°F.	106°F.	100°F.
11:32	500	112°F.	108°F.	101°F.
11:37	500	112°F.	108°F.	102°F.

Surgical diathermy employs much higher degrees of heat for the purpose of destroying tissues, particularly those of a malignant nature. In this respect it resembles the action of the cautery or of fulguration but it has much greater depth effect than either of these methods. Both cautery and the fulgurating spark char the tissues, and the eschar thus produced acts as a wall which protects the tissues beyond. In diathermy, on the other hand, the heat penetrates into the tissues, and reaches and destroys cancer cells which are desseminated in the periphery; for it must be remembered that malignant cells quickly succumb to heat. That this is not mere speculation, may be seen from the results obtained by Corbus & O'Conor, Curtis (*J. A. M. A.*, 1926, 87:1819) and others. The heat penetration can also be measured accurately by placing thermometers into the bladder and rectum. Thus, in a case of a very large cauliflower of the cervix, the temperature in the bladder, within one minute, rose to 102.8°, that in the rectum to 101.6°, although the electrocoagulation took place in the centre of the gigantic growth and at a considerable distance from the vesical and rectal thermometers.

Another way to determine the heat penetration in surgical diathermy is by means of thermocouples inserted into macroscopically normal tissues outside of the growth. Thus we found that 9 seconds after commencing the treatment, the temperature of the tissues 5 cm. away had risen 4 degrees F. Still more accurate is the table prepared by Dr. L. H. Jorstad, pathologist to the Barnard Free Skin and Cancer Hospital, who kindly helped me in this work.

Table III

Thermocouple Readings and Temperature Determinations.

	Distance of Thermocouple Needle from Tumor	Degree of Temperature attained after 1 minute
Case I. Cancer of Vulva	1 cm.	140 F.
	2 cm.	132.8 F.
	3 cm.	131 F.
Case II. Cancer of Vulva	1 cm.	120.2 F.
	2 cm.	114.8 F.
	3 cm.	111.2 F.
Case III. Cancer of Vaginal Wall	1 cm.	131 F.
	2 cm.	113 F.
	3 cm.	113 F.
Case IV. Urethral Cancer	1 cm.	122 F.
	2 cm.	113 F.
	3 cm.	104 F.

Summary

Diathermy, despite its youth, has already acquired citizenship in the field of therapeutics. In this paper, accurate figures have been supplied which show the exact degree of heat originated within the pelvic cavity, and prove conclusively that diathermy can focus heat in the genital organs and there produce and maintain temperatures far above those obtainable with any other method. As heat creates arterial hyperemia, and hyperemia, primarily, counteracts inflammation, the principal field of diathermy in gynecology is in the treatment of pelvic inflammations. This highly beneficial method may, however, become a two-edged sword if clear-cut rules regarding indications and contraindications, dosage, du-

ration, etc., are not scrupulously observed. It will develop its greatest usefulness only if combined with certain other antiphlogistic means.

To one who has a clear conception of the nature of the inflammatory process, the need for operative intervention in pelvic inflammations will arise only in exceptional cases. Should, however, such an operation become inevitable, previous conservative treatment, carried out systematically and over a sufficient length of time, will render the surgical procedure safer, easier and less extensive.

In chronic urethral gonorrhea, diathermy may succeed where other methods have failed to kill the gonococci in the ducts of Skene.

In the malignant disease of the female genitals, finally, where the affected tissues are destroyed by electrocoagulation, the deeply penetrating effect of heat may reach scattered cancer cells beyond the original growth.

Discussion

Dr. Gustav Kolischer (Chicago, Ill.): If by experience a surgeon arrives at the conclusion that conservative diathermy methods bring results in certain cases, such an opinion is an endorsement of the method. From all that I could gather by personal observation and the study of the work of others, I also can testify that diathermy is an invaluable agent in selected gynecologic conditions.

In certain diseases of the female, medical diathermy is now becoming widely recognized as a very useful agent. As to the technical points, I don't think the physicists and physiologists will agree with Dr. Gellhorn. As a rule, the heat produced by virtue of the resistance that the tissues offer to high frequency electric current that it passes through is about uniform. There is one exception that can be demonstrated by physical experiment. If electrodes of the same size are separated farther apart, we get less heat in the center between the electrodes than near the electrodes on account of the bulging of the electric power lines.

As to the reaction, I think we do not have to be so very timid in our restrictions of contraindications. Most of the contraindications brought forth against the use of medical diathermy in acute disease are not borne out by actual experience. You can find that to be the case, for instance, in treatment of acute parametritis, parasalpingitis, acute salpingitis, etc. There is nothing that relieves so promptly the suffering of the patient than the application of diathermy.

As to the application of diathermy, it is still believed in a great many quarters that the results are proportionate to the amount of heat that we are producing. That is absolutely fallacious. We know from physiological experiments that if living cells are exposed to intensive or prolonged heat, there is no coagulating of the cells, no destruction of the cells, but are simply reduced in vitality and their metabolism is paralyzed. Moderate temperature applied for a great length of time is much more useful than excessive temperature.

As to the explanation of the results: in one way, of course, it is perfectly correct to produce an arterial hyperemia, but that alone isn't all. The dilatation of the vessels simply furnishes a greater fluid supply. The carrying off of the products of inflammation, exudation and so on, is done by the capillaries and the lymphatics. The influence on the capillaries is one of the main stages in the action of diathermy. That the flux of all the tissue juices is increased may be demonstrated very easily by an experiment that has clinically been done quite often. Some gynecologists, in order to reduce the congestion, simply incised the vaginal wall to a little depth, and in this way produced edema. If it is compared with diathermy, the exudation—this inflammatory fluid—is so enormous the patient frequently becomes alarmed and thinks something has bursted inside, because of the steady flow.

Suppose we work with an acute parametritis, apply diathermy and complete the breaking down of the parametritic exudate, what about it? From the standpoint of the pathological physiologist, you simply increase the affluence of the blood. Simply transporting of the products of inflammation by the lymphatics would not be sufficient to explain it. We know better. I think I mentioned it before. We know that when there is an area of increased metabolism, it is produced by local heat. There occurs an immigration of the defensive cells. These cells are not only phagocytic; any cell may become phagocytic, but those are the only cells that imbibe and destroy the vaccines. That explains at the same time that the excessive heat will not be sufficiently powerful in its sanitary effect, but will be dangerous. It defeats its own purpose, because by precipitating the flocculence of the macrophage, we destroy their activity. That has been explained by physiological experiment. We know as long as the macrophage is active, inhibition takes place.

If, however, we precipitate the globulins, then the whole paramentrium takes up the stains of metallic compounds and the cell dies. That explains it.

So far as surgical diathermy is concerned, I cannot possibly agree with the others who claim simply on the authority of one man that the malignant cell is more susceptible to heat than any cell in the body. All our experiences will be against them.

A celebrated German surgeon had the idea of improving the results of treatment for cancer, which he called extirpation of the uterus. Following this method, at postmortems we found that the patients died from suppuration. There were just as many cancer cells found in the parametrium. There is absolutely no clinical or experimental proof that will tell us that a cancer cell is more susceptible to heat than any other cell in the body. I wish it were so, for then it would be easy to cure cancer, but it is not.

As to the treatment of gonorrhea, it is true enough that if you have to deal with an acute metritis in the female and you apply medical diathermy, you relieve the suffering very quickly; drainage is established and swelling goes down and the pain subsides. Quite often the subsidence of subjective symp-

toms is taken for a cure. It happens often in gonorrheal infection that if some intercurrent disease produces a rise in temperature, the discharge will stop and the gonococci will disappear temporarily. Very probably it is not the temperature; it is simply a symptom. It is certain metabolic changes producing the disease which temporarily suppresses the gonococci.

In chronic gonorrhea of the prostate, chronic gonorrhea of the seminal vesicle, in chronic gonorrhea of the cervix and of the uterine cavity, I do not know of any other method that helps along so much as medical diathermy. It is not demonstrated that medical diathermy, alone, will cure all these cases, but combined with all the other methods the results certainly are superior. The introduction of an active electrode into the uterus, I must honestly confess is something I haven't the nerve to do, because I saw cases in consultation, cases in charity wards, suffering from the effects of the introduction of an active electrode into the uterus.

It is a question for men to work out, whether it is necessary at all to introduce an active electrode into the uterus or the urethra.

We believe, judging from clinical experiments, (and we use a thermometer in the urethra) it is possible to increase the temperature of these cavities to a therapeutic height. We are convinced it is possible.

We believe that the gist of the whole matter is this: Diathermy, like other methods, has excellent opportunities and excellent qualities within its limitations. To overstep the limits, to either treat cases that are not the subject of diathermy or to exceed the permissible limit of heat, is to damage the patient, and certainly doesn't help the prestige of the doctor and leads to a bad reaction. Some teachers and supposed authorities who have employed diathermy have become disgusted with it. Modification of it will lead to the rehabilitation of medical diathermy.

Dr. Mortimer N. Hyams (New York City): From the last speaker we are made to believe now that acute tubes and acute pelvic inflammatory conditions are to be treated by diathermy. I was under the impression today that the acute and in the subacute stage they were to be left absolutely alone.

Dr. Gellhorn's paper was indeed very interesting, and, I believe, very conservative. He has emphasized several things which I made note of, and which I think are very important. First, is the necessity of an absolute diagnosis. I have seen many cases of ovarian cyst and ectopic pregnancy diagnosed as a pelvic inflammatory tube. Diathermy was given. It is not uncommon in the clinics of New York City to see this, and opinions are still at variance as to its indication.

From the pictures we saw today we are again to surmise that the currents pass from one electrode to another, almost in a straight line. I tried to bring this out this morning that there are certain tissue resistances. I wonder if we can put a plate on the abdomen, or a belt electrode, disregarding our bony structures, and pass through a tremendous heat that will center itself on the cervix or in the vagina, considering tissue resistance that those currents must go through.

The doctor remarked about the different types of machines. I spoke of that this morning. A standardization of machines is absolutely essential in order to get proper results. I didn't have time this morning to enlarge on one point. The doctor made the statement that the gonococci are destroyed at a temperature of 108 degrees. May I just take time to read two or three paragraphs on the different heats necessary to destroy the gonococci by different methods?

For example, Kirschfelt in 1925, from the Department of Pharmacy of the University of Minnesota, proved that with large electrodes over large surfaced areas on dogs it was impossible to obtain 106 or 108 degrees without skin damage.

Corbus' and O'Conor's article has been quoted and requoted constantly. Frantz says that 109.4 kills the gonococci in many hours. In about 1894 Wertheim stated that at 113 degrees no damage was done to the gonorrheal organism in two hours. Santus reports the gonococci destroyed at 113 degrees in thirty-seven minutes. Van Putt states that at 106.7 the organisms die after five days' exposure. Thompson states at 104 degrees they just survive, but he does not give the time.

I am bringing these points up to show you the difference in the type of temperatures that are necessary in order to destroy that particular type of organism. We must ask this question: Do we ever kill them? Are they ever destroyed by means of any of our therapeutic agents direct (I mean correctly), without helping nature's power to come back and destroy the organism itself?

I want to ask the doctor if in his paper he is referring by pelvic conditions to Neisserian infections or non-specific infections? Are we dealing with a gonorrheal condition or a streptococcus, a staphylococcus or colon or pneumonic organism? Surely, the treatment would be entirely different.

I, unfortunately, had two cases of pelvic abscess following the treatment by diathermy. They were not gonorrheal in origin. Other organisms such as streptococcus and staphylococcus, are destroyed at a much higher temperature, or are supposed to be destroyed at a much higher temperature, at least in the test tube, than are the gonococci. So that by producing heat in the pelvis, we are doing more than giving these other organisms a beautiful medium to grow on; we are adding heat to the soil and they grow until we have a pelvic abscess.

I believe one important part in selection of treatment is diagnosis—diagnosis of a different type between a specific and non-specific infection.

Chronic urethritis is not a very frequent occurrence, I believe; and when it does occur, it is usually an involvement of the structure of the glands, particularly the small glands not usually referred to in our textbook—the small glands in the mid portion of the urethra. You must destroy those glands as well as the Skene's glands if you hope to effect a cure. I am afraid to treat a chronic type of gonorrhea of the cervix. I don't believe there is enough to warrant our making any comparison or making any definite statements. I was under the impression that chronic infections of the cervix did not respond so readily to diathermy, and even the authorities today recently made it very plain that their results were not so good in that particular

type of case. We can understand that readily when we realize the anatomy of the cervix with its covering of epithelium at the tips, limited in just that small inch, with its infiltration of its gland structures, no submucosa, basement membrane, and these glands penetrating practically into the corium of the structure. Will diathermy go in and destroy those glands an infection contained inside? I still believe it is quite a disputed question. I believe that some other type of eradication is far better wherein these gland structures are removed than by any type of local application.

Dr. M. A. Roblee, St. Louis, Mo.: I should like to state that I most heartily agree with Dr. Gellhorn in all the essential points that he has brought out in his most interesting and instructive paper. The work that has been done by Drs. Royston and Ewerhardt and myself at the Washington University Clinic on pelvic diathermy makes me emphasize two points in particular: First, certainly, accurate diagnosis is most important before deep heat treatment in the female pelvis is undertaken.

In our preliminary report Dr. Royston felt that we should have some clinical means of determining whether or not any chronic or subsiding subacute inflammatory process was made worse by tissue temperatures of 110° to 111°. We used the Schilling Differential blood counts as a clinical index to the activity of infection in the body, and in our series no subsiding subacute or chronic process was made worse under treatment. I would like to show the following tables to record the Schilling differential counts taken before and after treatment on successive treatment days in a limited number of cases. (Lantern slides.)

Our attention also has been directed to the advisability of devising some sort of cervical vaginal electrode that would by nature of its position in the female pelvis, approximate as large an area about the cervix and laterally as near the tubo-ovarian regions as anatomically possible. We have felt that the Corbus electrode might successfully treat an endocervicitis but, because of its small size and heat localizing properties, it was inadequate for general pelvic deep-heat treatments, bearing in mind, however, that even this method produces somewhat of a general hyperemia. (Lantern slides.)

The Chapman electrode we feel when properly placed might be effective, but here again the changing position of the corpus uteri and adnexal masses would, we felt, handicap its general usefulness unless painstakingly placed, keeping in mind the given pelvic anatomy. (Lantern slides.)

The next lantern slide shows the Graves' Bivalve Speculum placed in the vagina up side down. This can be used after a fashion but there is too much short circuit current leak out through the vagina, over the perineum and through the symphysis, spoiling the path of deep-seated current. (Lantern slides.)

Next is the Zener electrode with its four-blade cervical contracting mechanism. We considered this a very substantial advance in deep-seated heat technique. Our greatest criticism of this instrument is that erosion in the hinges takes place after repeated boiling and the electric contacts are sometimes thus interferred with. (Lantern slides.)

We feel that a combination vaginal-fornix expansion electrode and lateral cervical contracting electrode combined in a single unit, properly insulated from current leak through the vagina over the perineum and symphysis, would, by nature of its anatomical position, enable us to pass a larger amount of electric current directly through the corpus uteri and adnexal regions. By this new method we are able to maintain approximately 110° in the cervical canal for fifteen to twenty minutes of active treatment. We feel that this temperature is closely approximated in the tubo-ovarian regions as well.

Dr. N. H. Polmer (New Orleans, La.): Some years ago Dr. Gellhorn visited us in New Orleans and spoke of the effects of protein therapy in chronic pelvic inflammatory disease. Now I am glad to come to St. Louis to a physical therapy convention and hear Dr. Gellhorn, a gynecologist, tell us physical therapists how he has achieved better results in the realm of gynecology by employing our measures. I only wish Dr. Gellhorn could put this message over before the gynecologists as one who does physical therapy on referred cases. I wish to state that the gynecologists send us cases of phlebitis, send us post-operative cases, but very rarely do they send us chronic pelvic inflammatory disease cases.

The message Dr. Gellhorn gives the physical therapist is: "Mr. Physical Therapist, be sure of your diagnosis. Be sure your case is chronic. Be sure the temperature is normal, has returned to normal and remains normal after pelvic examination. Be sure the leukocyte count is under 10,000."

The message Dr. Gellhorn should give to the gynecologist is, "Mr. Gynecologist, won't you try to use diathermy in addition to your other measures?"

The question of intravaginal or intracervical versus anterior posterior applications of electrodes is still a mooted problem. Do we want to merely increase pelvic circulation about a deep-seated arterio active hyperemia? If so, we probably can get that by an anterior posterior application.

If the crux of the treatment lies in a topical application of your electrodes as close as possible to the lesion, then probably we would have to resort to instrumentation. In referred cases, chiefly for esthetic reasons, we have employed mostly the anterior posterior applications.

Dr. George Gellhorn (St. Louis, Mo.): I feel that if I had heard these remarks made here beforehand, I would have written a very much better paper. I want to thank these gentlemen who have discussed it. There are just these few principles that one cannot repeat often enough: Diathermy as a method is, of course, no curative method; it is only the effect of diathermy upon the circulation. That is my firm conviction. It is the stimulation of the natural defenses of the body and for that reason it should be combined with protein therapy. I didn't know about diathermy when I was in New Orleans. I used hot douches and the like in order to help the effect of protein therapy. But the good always gives way to the better method, and diathermy is by far superior to other methods of stimulating the arterial hyperemia which is the means

of neutralizing poisons, of washing out waste products, et cetera.

It doesn't make much difference, Dr. Hyams, whether the chronic inflammatory condition is of gonorrheal or other bacterial origin. The hyperemic effect would be the same. It would either destroy the effect or neutralize the effect of the inflammation and bring about a restitution as far as restitution is possible, or else it would wall off the inflammatory process, perhaps lead to the production of an abscess and then make it amenable to surgical treatment without the mutilation that operating in the thirty-day stage would bring.

I quite agree with Dr. Hyams that it is impossible for diathermy to destroy cervical glands, but it is possible to mobilize those efforts of the body that will do away with the inflammation.

ULTRAVIOLET RADIATION IN THE MANAGEMENT OF CORNEAL ULCERS *

O. B. NUGENT, M.D.

Professor of Ophthalmology

Chicago Eye, Ear, Nose and Throat College

CHICAGO, ILLINOIS

The lack of proper nourishing fluids in a given space in the epithelial layer of the cornea will allow necrosis and sloughing of the epithelial cells of that area. This, bathed in toxic fluids produced by bacterial growth, accelerates necrosis, and ulceration of the cornea proceeds almost unhampered by normal process of repair.

The cornea of the human eye is about one (1) mm. in thickness, the greater part of which consists of the substantia propria or stroma, the latter being made up of many layers forming potential lymph spaces of which there are about sixty. These spaces or channels serve to convey lymph containing nutriant elements, protective bodies and cells which are derived from the para-corneal vascular system by way of the so-called lymphoid tissue surrounding the limbus.

The substantia propria is closely covered by the homogeneous elastic membranes, the one covering most of its anterior surface known as Bowman's membrane is in turn covered with about ten layers of epithelial cells; and the posterior one, Descemet's membrane, is covered on its entire posterior surface by a single layer of endothelial cells.

Both membranes are impervious to micro-organisms, but allow the diffusion of certain fluids through them. Therefore, fluids containing bacterial toxins often penetrate to the substantia propria from without or within the eye, and consequently set up a condition which results in infiltration of round cells and fibrous exudate, thus blocking the lymph channels which reduces the flow of nutriant fluid to the tissues.

The accumulation of round cells and exudates produces a cloudiness of the cornea which often appears around a given inflammatory or infected area, and is known as ring infiltration.

The appearance of ring infiltration is often times utilized, clinically, for the purpose of determining the virulence of the infection. If the infiltrated area extends up to the margin of infection or active necrosis, it is termed positive chamotaxes, and indicates a later stage of development; but if there is a clear portion of cornea between the area of necrosis and the ring of infiltration—negative chemotaxis—it is to be classed as an earlier stage of progress. Positive chemotaxis appearing early in corneal ulceration indicates a more virulent type.

Cause of ulcer of cornea is often spoken of as being traumatic, infectious, secondary to other conditions, etc., but the real cause of corneal necrosis is bacterial infection (which is ever present in active ulcerations) and improper nutrition to the individual cells involved.

If the debris is scraped from an active ulcer and examined under the microscope, it will be found to consist of an almost pure colony of micro-organisms together with dead epithelial cells and leucocytes. It may be said, therefore, regardless of other associated causes, that the foremost factor in the causation and progress of the corneal ulcer is bacterial invasion.

Treatment of ulcer of the cornea is always, of necessity, directed toward the sterilization

* Read before the Ninth Annual Meeting of the American Congress of Physical Therapy, St. Louis, Mo., September 8, 1930.

of the necrotic and para-necrotic area, and the agents commonly used are given by most authors as antiseptic and caustic, such as bichloride of mercury, formalin, tincture of iodin, carbolic acid, and, perhaps most effective, the galvano-cautery, most of which are preceded by curettement of the ulcer, frequent irrigation of the conjunctival sac, subconjunctival injection of normal salt solution or of cyanide of mercury, injection of some form of foreign protied, and many other remedies, too numerous to mention, are also used.

The greatest difficulty in the recognized treatment of ulcers is the sterilization of the necrotic area, as any agent strong enough to kill bacteria will, of course, destroy all the delicate corneal cells with which it comes in contact, and the ulcer is unavoidably made larger and more extensive; then, again, many of the germs are too deep in the tissue to be affected by such measures.

Ultraviolet radiation in the writer's hands in the last two and one-half years has put all the foregoing local treatments in the discard, except the use of conjunctival irrigation in a few of the cases. If properly applied, it is all that is necessary for the local treatment of any form of ulcer of the cornea. This is a broad statement, and is substantiated by the results obtained in the treatment of several hundred corneal ulcers of nearly every variety and of most every cause.

The tabulated results given below are from a series of 1076 patients from my clinic, suffering with almost every variety of eye complaint, involving fifty cases with infected corneal ulcers, a little less than five percent of all cases. Only the infected type of ulcer was considered in this group. Abrasions and more extensive non-perforating injuries to the cornea which did not become infected although treated by ultraviolet radiation, were not considered as they were not true ulcers, and as this paper deals only with ulcers, it would not be fair to classify them here, although many of those cases would doubtlessly have developed into ulcers had they not been treated with ultraviolet radiation.

Classification of the cause of ulcer in the fifty cases:

28—Pneumococcus.
4—Diplobacillus of morax axenfeld.
5—Staphilococcus.
3—Xerosis bacillus.
4—Trachoma.
6—Negative.

The finding of the bacteria was accomplished mostly by a smear and the predominating germ considered the causing factor. Cultures were not made in all cases.

Ultraviolet radiation has two distinct actions:

First, it is a most powerful germicidal agent, so effective as to produce sterilization of the necrotic area in one treatment provided the proper dosage is administered under favorable circumstances.

Second, it has accelerative action to the process of repair.

The latter effect is probably due to the beneficial action of ultraviolet to the living cell and because of its germicidal action eliminating the source of bacterial toxins, which are so destructive to the normal cell.

The Birch-Hirschfeld radiation lamp of Zeiss was used in all my cases. The technique is very simple, but requires constant and careful attention all during its administration. The lamp is arranged in such a manner as to make it possible to direct all the rays on to a small area or to cover a large area.

The initial dose should not exceed four minutes and usually is three and one-half minutes. This is increased half a minute each treatment until five minute doses are given, which is usually considered a normal dose.

There seems to be a difference of opinion as to the frequency of treatment. Birch-Hirschfeld treated cases as often as three times a day. This method, which I originally used in my earlier cases, was soon cut to one treatment a day, and now I administer it only once every two days, which I find just as effective.

Often the question is asked: "How many treatments are necessary to cure an ulcer?" The only answer is to treat the ulcer until it is entirely covered with new, healthy, epithelial tissue. In many small ulcers, one treatment was all that was necessary for, after a perfect sterilization of a small ulcer, twenty-four hours to forty-eight hours is all that is required for the epithelial tissue to completely cover the necrotic area. This, again, depends upon the amount of infiltration or cell destruction present at the time of the initial treatment.

One of my cases required forty-seven treatments. It was a serpiginous ulcer with destruction of about sixty percent of the cor-

neal surface, but in a very large percentage of cases the number of treatments are from one to four. Only those neglected cases, or cases which have been unsuccessfully treated by the heretofore recognized methods and have extended their necrotic destruction to a large area, with much infiltration into the stroma tissue, will require a larger number of treatments, as the ulcer must be kept sterile during the entire process of healing.

Case Report

F. B., Male, aged 50. Entered clinic December 28, 1923. Diagnosis: trachoma. Vision, R. 20/100; L. 20/25. History: Has had many attacks of corneal ulcer in the last ten years. Examination: Much watery discharge from both eyes; large ulcer on right cornea, slightly to the nasal side of center; large ring of infiltration; positive chemotaxis and almost completely surrounded by a plexus of vessels (Pannus) of very large size originating from the superior nasal portion of limbus, and much swelling of bulbar conjunctiva. Left eye shows a large area of necrosis of the superficial cells of the cornea to the temporal side. No Pannus formation. Many trachoma bodies on palprebral conjunctiva and much scar tissue.

He was treated with copper sulphate, silver nitrate, carbon dioxide snow, protonuclein powder, the lids were curetted and rubbed with gauze. The ulcers were treated in the usual way. The progress was slow and he was treated in my clinic until February, 1926, a period of over two years. He moved out of town and I did not see him again until December, 1928, a period of three years. At that time, he had an ulcer on each eye, both of which were accompanied by a well-formed Pannus. The trachoma was quite active with much mucopurulent discharge. Repeated smears and cultures showed a predominance of staphylococcus.

The treatment was begun by giving him a solution of sodium biborate and boracic acid to irrigate the conjunctival sac, and ultraviolet radiation was started with three and one-half minute exposure to each eye, which was gradually increased until the dose was of five minutes duration. On the third day when he came for treatment, the eyes were free from all discharge, and at the eighth treatment, the Pannus was scarcely visible with the aid of the loop, and the ulcers did not stain with fluorescein.

Examination with the slit-lamp showed new epithelial cell formation over the entire ulcerated area. He did not return again, after the ninth treatment for six months. At this time, he gave a history of not having had the slightest trouble with either eye until two days preceding his visit, when the right eye began to water and became painful.

Examination showed cornea normal in both eyes, but under the right upper lid near the nasal edge of the tarsus were two small trachomic bodies with the usual infiltration and inflammation of the surrounding conjunctiva. Again ultraviolet radiation was administered for five minutes over the whole corneal surface, and he was given a one per cent zinc sulphate solution to use at home. Five months later, he came to the clinic, again stating that he had had no trouble until a week previous to the visit, and again some inflammation was noted under the upper lid, near the nasal edge of the tarsus of the right eye. Two more treatments were given of ultraviolet radiation, and both eyes have remained normal up to the present time.

The above case was an old established trachoma of sixteen years' duration. I treated him for more than two years with the recognized treatments for trachoma and associated corneal ulcers and Pannus: three years more he was treated in another city and returned to me in a worse condition than when I had first seen him, five years previous.

He was then treated with ultraviolet radiation and entirely cured in nine treatments, four of which were given at daily intervals, and the last five every other day. Six months later, the condition started in the right eye and was checked by only one treatment, after which a slight recurrence was cured by two treatments, with no return of the condition to date. Time and space will not permit of more case records.

Summary

1. Ultraviolet radiation with the Birch-Hirschfeld lamp, properly applied, has been found to be one hundred percent efficient in the sterilization of corneal ulcers, regardless of what form of infection is present.

2. If a corneal ulcer is kept free from infection, it will be recovered with corneal epithelium in a very short time, provided there is a free flow of lymph in the lymph spaces of the corneal stroma.

3. Healing of corneal ulcers can be affected by this method without the necessity of curettement or cautery of the ulcer, which destroys a certain portion of healthy tissue around the ulcer.

4. Trachoma is readily controlled and in a large percentage of cases cured by the simple repeated application of the light on the corneal surface.

5. The treatment is easily administered.

231 W. Washington Street.

Discussion

Dr. Carl B. Sputh (Indianapolis, Ind.): When I took up physiotherapy for eye, ear, nose and throat diseases, I was anxious to learn all that was known of the action of the various apparatus. It so happened that I spoke to a man who did quite a great deal of research work with the ultraviolet. He informed me that he had had a corneal ulcer which was treated with ultraviolet. The reaction was so intense, almost unbearable, that he did not advise anybody to treat corneal ulcers with this agent. That, of course, frightened me and as a result I have never tried it. However, when Dr. Nugent demonstrated his carbon lamp yesterday, I could readily understand why some of us have been discouraged with the treatment as applied by means of the water-cooled quartz lamp.

I have treated corneal ulcers by the classical methods of chemical cauterization and frequently

in spite of intensive treatment the lesions keep on spreading and penetrating deeper. When the progress of the ulcer is finally checked two-thirds of the cornea is destroyed. The result is a scar which not only is unsightly but also obstructive to good vision.

I should like to ask Dr. Nugent whether there is any reaction following the application of ultraviolet on the cornea. I should also like to know whether there is any visible scar formation.

It has been stated by a number of investigators that ultraviolet rays have the ability to produce coagulation of the lens, especially in the presence of electrolytes, also that ultraviolet rays may cause changes in the lens by interfering with its nourishment by damaging the ciliary process.

I am anxious to use any type of treatment that is better than what I am using at the present time. However, before adopting a new method I want to be reasonably sure that there is no permanent damage done to any of the vital structures of the organ which I am treating. I will appreciate it, therefore, if Dr. Nugent will tell us whether or not he has noticed any serious changes in the crystalline lens or other vital structures of the eye, following treatment with the ultraviolet rays.

Dr. Ramon Castroviejo (Chicago, Ill.): I should like to say a few things about the ultraviolet lamp that the essayist has been using because I have had some experience with it. First, the effects produced are different according to the instrument employed. For instance, we should not say that this instrument (referring to Zeiss lamp) is five times as active as the water-cooled quartz lamp. The effect we obtain with this machine, from a dose starting with three minutes, is stimulating, and when we reach thirty minutes it is cauterizing.

The water-cooled lamp that I have been using in trachoma is in the first moment cauterizing. I have been treating patients with trachoma according to the principles commonly recognized when medical therapy is employed. For instance, a patient with an acute attack of trachoma and granulation was treated with 25 per cent silver nitrate in order to produce a serious cauterization of the conjunctiva and to increase the sclerotic process of granulation. Afterwards this treatment was used only once a week. This solution has a sedative and stimulating effect to the same granulation. In contrast to this medical treatment, I have been using the water-cooled lamp in applications of thirty seconds and not over one minute, and the reaction was severe. It was just as severe as the reaction obtained by using the 25 per cent solution of silver nitrate.

The effect of ultraviolet irradiation in the beginning might be compared with that of the x-ray and radium. At first it is stimulating. Later there is coagulation and destruction of tissue. According to the time of exposure, you obtain one or the other effect.

Dr. A. B. Crites (Kansas City, Mo.): I have treated corneal ulcers with the water-cooled ultraviolet lamp, but I give very short exposures in order to avoid severe reactions.

My method of raying ulcers is with a fine quartz pencil. I start with two seconds and build up. A little too much will, of course, produce a reaction of conjunctivitis after from six to eight nours. I have had that myself. There is no permanent ill effect from an over treatment of the ultraviolet.

As to the penetration causing changes in the lens, I can't see how that can possibly happen. The penetration of these short rays of ultraviolet is so slight that I am unable to understand how an effect is produced either in the ciliary body or in the lens, unless it is because of the extreme reaction that an over-treatment causes.

Dr. Ira O. Denman (Toledo, Ohio): This is a topic which is very interesting to me. In fact, I allude briefly to it in my paper to follow. I am not acquainted with this lamp and base my observations only on the water-cooled lamp.

I wish to anticipate what Dr. Nugent may say in answer to the doctor from Indianapolis by assuring him that the possible deleterious effects of ultraviolet upon the crystalline lens have been exhaustively proven in the negative by the General Electric Laboratories in Schenectady. Their work was done on the eyes of animals and extirpated eyes. There is apparently no effect whatever on the constituent elements of the crystalline lens.

For eight years I have been using the water-cooled lamp in corneal ulcers and feel quite enthusiastically in favor of it, but I cannot go so far as the essayist and give it as the only means of treatment. I should be loath to rely upon it solely, especially in serpiginous ulcers, because I have never yet seen a serpiginous ulcer (they may have existed) that was not accompanied by complications, especially iritis.

I should not be content to use any measure in those cases, from the present state of my knowledge, without accompanying it by atropin and cold applications, ice applications, believing that ultraviolet will sterilize while it is being applied, but that the cold and atropin in the interim deter the propagation of bacteria.

Dr. E. A. Miller (St. Joseph, Mich.): There is an underlying cause of all corneal ulcers. Unless you remove the cause there will be a recurrence or a continuation of the ulcer. In view of this I cannot understand the essayist's statement that he treats all cases with the light alone.

In trachoma it is difficult to maintain a cure of the ulcer if there is trouble under the lid. The active condition may improve, but the scar tissue remains. I am sure you have all seen the trachoma case with the rough conjunctival surface of the upper lid producing a pannus that would break down with the ulcer. Unless you smooth down the under surface of the lid the ulcer remains unhealed. The ulcer will get well without any trouble if the under surface of the lid is healed smoothly.

I should like to have the doctor explain in his closing talk how a cure can be obtained in serpiginous ulcer or the ulcer in the old person who is having some lid trouble, unless the accompanying condition is treated at the same time.

Dr. E. G. Linn (Des Moines, Iowa): In talking with Dr. Nugent today, I reported a case of serpiginous ulcer just now mentioned by the doctor, that I treated with more satisfaction than I have treated other cases. I haven't had many as they are not so common.

This ulcer was a very beautiful picture, as corneal ulcers of the serpiginous type appear, and was in a vigorous young man, an athlete. At the end of twenty-four hours after the first treatment with the water-cooled ultraviolet lamp, the ulcer seemed to have been checked. At the end of forty-eight hours, there was a recession in the invasion evidenced, and at the end of another forty-eight hours I regarded the infection as having been eradicated. There was no recurrence.

I treat all of my corneal ulcers with the ultraviolet, (not with the machine that the doctor is now using). I expose them from twenty to thirty seconds, being careful always to point the pencil at an oblique angle to the corneal surface. None of the light penetrates the eye, and no harm can result. Even if the lens, as has just been told us, is not harmed by the ultraviolet rays, I still like to treat at an angle that will not permit the light to pass through the pupil.

I believe there is no method so satisfactory as the ultraviolet light for corneal ulcers. I stain with mercurochrome first. That helps rather than hinders the action of the ultraviolet light. The frequency with which I treat depends upon the seriousness of the case, never, of course, running over the great length of time that the doctor uses with the light that he has. I have had no experience with the lamp which the essayist demonstrated.

Dr. Oscar B. Nugent (Chicago, Ill.): I am very grateful to those who discussed the paper for their remarks and for the questions they have asked me.

I see where my paper has not made some of the points clear. First, Dr. Sputh asked regarding the reaction from over-dosage. I have never had a reaction from an over-dose, for the reasons that I have pointed out very carefully and cautiously. I have never gotten out of my mind the results that some investigators have had on animals with the ultraviolet, and I am fully cognizant of possible dangers. This lamp is exceedingly weak in its ultraviolet output as compared with the quartz mercury. This you can appreciate by the length of time that we have to treat, five minutes being the average dose.

As to scar tissue, we know that all corneal ulcers, if they go beyond a certain depth, will result in scar tissue, but the scar tissue that results in ulcers cured without instrumentation, without medication, is, of course, smaller than that which is effected where medication and much curettement and much cauterization have been administered.

The case that I treated forty-seven times, Mr. D., an attorney of Chicago, had serpiginous ulcer. I watched his lens and examined it many times with the slit lamp and found absolutely no indications whatsoever of any deposits.

As to trachoma, it is remarkable what happens to trachoma when you simply apply this dosage to the cornea alone without even everting the lid. I was very agreeably surprised with the first case I treated of corneal ulcer due to trachoma. It had a pannus with a complete ring of anastomosing vessels around the corneal ulcer. To my surprise after the third or fourth treatment the pannus was entirely gone. Then I began to investigate the condition under the lids, and I found that at least seventy per cent of the trachomic bodies had disappeared in that short time.

I am so glad the doctor spoke about the use of atropin, because serpiginous ulcers almost invariably are associated with iritis. Whenever iritis is present, atropin is always used in my cases, but I do not consider that any treatment whatsoever for corneal ulcers. Some years ago every case of corneal ulcer was treated with atropin. About five years ago Dr. George Suker of Chicago came out with a startling statement that atropin was absolutely useless in the treatment of corneal ulcer. From that time on I have never used atropin in corneal ulcers unless there was an iritis present. In children I use it to evade or to ward off the almost inevitable iritis that comes on, and in adults when there is a photophobia present.

I am glad the question was brought up as to other types of treatment because I do not want to be misunderstood. I treat all symptoms that present themselves outside of the corneal ulcer. I believe that ultraviolet is all that is necessary to cure a corneal ulcer. Of course, if there is an iritis or other symptoms, these must be treated with the classical methods. I see that my statement was slightly misleading, because I do treat complications as they arise.

As to the etiology, I stated in my paper that the real causation of corneal ulcer is bacterial invasion, or a lack of proper nourishment to the tissues involved, one of the two. We have corneal ulcers due to abrasion, we say. The abrasion has only allowed a nucleus of infection for the bacterial invasion. We know that that is true in most ulcers that can be traced back to traumatism. Then there is doubtless a great percentage of ulcers of the cornea due to unknown traumatism.

The other class of causations of corneal ulcer: Invasion of toxins, either from other focal infections or from the infection of bacteria in the conjunctival sac, or lack of nutrition from toxic origin, like in ulcers that sometimes occur with interstitial keratitis. The latter is usually due to improper nourishment of the epithelium.

MEDICAL DIATHERMY IN THE TREATMENT OF HEMORRHOIDS *

DISRAELI KOBAK, M.D.

CHICAGO

With the growing conservatism in all branches of modern medicine, and in surgery in particular, the tendency has been in the direction of less radical procedures. Surgery is still the predominant method in the treatment of hemorrhoids, but palliative measures are of late more frequently mentioned. It is the purpose of this communication to stress the palliative effect of medical diathermy in selected hemorrhoidal conditions.

A hemorrhoid is defined as a varicose tumor affecting the roots of a single or group of hemorrhoidal veins, and is recognized by bleeding, pain and prolapse. It is characterized by the formation of interstitial connective tissue, ulceration, thrombosis or spontaneous cure. Hemorrhoids are usually classified as external, internal and combined. The external hemorrhoids originate from the inferior hemorrhoidal vein, the internal from the superior hemorrhoidal vein. The muco-cutaneous line is the boundary that separates the external from the internal. The external is covered by cutaneous tissues, the internal by mucosa.

The external, thrombotic variety is easily recognized by its tense, smooth, shiny skin, by its ovoid form, livid color and its severity of local symptoms. The subjective symptoms may vary from a feeling of discomfort on sitting or walking to that of extreme, excruciating pain. It is due to a rupture of all the coats of the vessel. Clotting occurs in the adjacent connective tissue. Re-absorption may gradually ensue and leave in its place a redundant mass of connective tissue in the form of perianal tabs. Treatment in the form of rest and hot applications, produces in some cases a resolution of the thrombus in a period from seven to fourteen days. Complications may occur to form ulcers, abscesses or superficial fistulae.

I have found diathermy to be of considerable aid in this particular type of complication. Relief from pain has been the outstanding effect in all of the 34 cases which have been under observation in the past three years. The average number of treatments has been three for each patient. Some have been completely relieved with the first treatment. Two were eventually operated upon for recurring symptoms and internal hemorrhoids. One patient, a physician, has been free from untoward symptoms up to August, 1930, a period of three years.

Technic

The following technic has been employed in these cases. Gentle washing of the thrombotic pile with pleasantly hot soap water; the patient in Sim's position. An abdominal electrode (Cumberbatch type) is then fixed about the abdomen, connected to one of the terminals of the diathermy machine by a suitable cord, and is held in position by a three inch abdominal elastic bandage. Cellu-cotton, or spongiopilene, saturated in normal, hot saline is then moulded over the affected pile. The average size of the mould is about 2x3 inches. A 1x2½ inch silver cigaret foil is then placed over the moist cotton and connected to the other terminal of the diathermy machine. A three inch rubber elastic bandage is fixed over this electrode, and brought upward, anteroposteriorly, to firmly hold the rectal electrode in place. It is pinned to the transverse abdominal bandage to form a "T" bandage. The current is gradually introduced to the point where the patient experiences a sensation of pleasant heat. The minimum of 15 minutes is usually given the patient in the first treatment which is progressively extended to 30 minutes in the succeeding treatments. This method is followed in the interest of conservative measures. It is always best to undertreat, rather than overtreat an acutely inflamed part.

The advantages of fixing the electrodes in the manner described above is to produce an even distribution of the current flow in the affected part, and to direct the lines of force from the circular, abdominal electrode toward the affected area in every direction. The active electrode is located in the center of this current flow and the indifferent electrode is

* Read before the Ninth Annual Meeting of the American Congress of Physical Therapy, St. Louis, Mo., Sept. 8, 1930.

so situated as to simulate the periphery of a wheel. The lines of force resemble the spokes in a wheel; the active electrode, the hub. The technic is obviously superior to that which attempts to utilize indifferent electrodes of large metal plates and active electrodes made of block tin. The current is more evenly distributed when the electrode is moulded to the tumor, rather than the tumor moulded to the electrode.

Comment

The indirect causative factors of hemorrhoids are conditions that tend to engorge the portal circulation. The more direct factors are trauma, constipation, and straining at stool. The pain is due to the tension and pressure of the clot on the numerous sensory nerve endings in the perianal skin. If the condition is left untreated, organization and connective tissue formation takes place and leaves a permanent inelastic and redundant mass. Degenerative changes which occur in the elderly patient may be the precursor for malignant conditions. Medical diathermy is of value not as a panacea, but as an important adjuvant to recognized procedures. Conservative surgical measures can thus be reduced by more than fifty per cent because this form of treatment is based upon physiologic premises.

The effect of diathermy is the production of an active hyperemia. It favorably influences early stasis and congestion. It has absorbtive and resorbtive properties. It removes waste products, reduces the viscosity of the blood, and prevents connective tissue formation. Pain is relieved by virtue of the decongestive effects of active hyperemia. Pressure on nerve-endings is relieved by the resorbtive action of physiologic heat, evoked by properly applied diathermy. It has the necessary therapeutic properties to excite restorative effects.

Internal Hemorrhoids

Medical diathermy is not advocated as a cure for severely prolapsed internal piles. Such cases, frankly, belong to the surgeon's care. But even in these conditions, palliation can be obtained. It offers that "breathing spell" so frequently necessary to patients to set their business in order in preparation for a hospital stay. Its chief indication is the early uncomplicated cases and the mixed varieties.

The factors productive in the formation of internal piles are similar to the causes mentioned in the discussion of the external varieties. Congestion of the portal circulation is here also considered as one of the main exciting causes in the production of varices in the superior hemorrhoidal vein. A congested liver, due to uncompensated heart, the eating of highly seasoned foods or habitual constipation—all or each may lead to the formation of piles.

As a result of pressure, congestion, and straining at stool, an unusually high local blood pressure is produced on the venous roots which causes them to dilate. The muscular and elastic tissues of the vessels are replaced by fibrous material. Rupture, ulceration, congestion and inflammatory changes take place. Abrasions, bleeding and the formation of fissures may follow from the passage of hard feces. A fully developed internal hemorrhoid may have the symptoms of bleeding, (bright red), protrusion, and a varying degree of pain and smarting, or a sensation of uncomfortable fullness.

Ambulatory treatment of hemorrhoids has heretofore been in the hands of irregular practitioners, and is even to this day unfortunately exploited beyond its scientific merits. It is because of this that any new advance in this direction has been looked upon with suspicion by the leaders in our profession. Many patients, however, have an unreasonable aversion to surgery, and have sought other measures of relief in spite of influences to the contrary. Experience with medical diathermy in the palliative treatment of hemorrhoids has been cautiously extended by competent workers. Its usefulness as a pain relieving agent in hemorrhoidal affections has been recognized by such authorities as Turrell, Cumberbatch, Kowarschik, Nagelschmidt and Bordier,—all of whom have made mention of its value.

In spite of a very large volume of material that comes to my service at the Cook County Hospital, in Chicago, the number of these cases suffering with internal piles have been few. The majority of cases are referred for other conditions, and hemorrhoidal affections are discovered as coincident to other ailment. In the past three years my combined hospital and office record of such cases treated non-surgically totaled 46 in number. The severer

types (private cases) usually presented a history of chronicity with the cardinal symptoms of pain and discomfort, protrusion and bleeding. Medical diathermy was administered in all cases but varied somewhat from the method advocated by others. My purpose was to combine a form of treatment that would influence the rectal pathology by improving the portal congestion and reduce the pressure in the hemorrhoidal plexus. A non-constipating diet, free from rich and highly seasoned foods, was also prescribed. The use of a mineral oil, such as petrolagar or agar oil, was recommended because of its softening and lubricating effect on impacted fecal matter. In consideration of the decongestive and pain relieving qualities of diathermy, this agent was administered to the liver and the internal pile on separate occasions.

It was here observed that pain was the first symptom to vanish. It frequently disappeared during the treatment. In some, the symptoms returned within forty-eight hours, but became less acute as treatment continued. In the great majority (69 per cent) bleeding ceased in less than eleven applications. Protrusion of internal piles was reduced in the early cases. Those complicated by fibrotic changes and redundancy due to loss of elastic tissue were not as readily influenced. The number of treatments varied with the severity of the condition. All the patients remained ambulatory; they were at no time confined to bed; they suffered from no complications.

Technic

Probably the best metohd at our command to reduce liver stasis and portal congestion is by means of diathermy applied to the region of the liver. If accomplished, one of the major factors in the production of hemorrhoids is overcome. Purely on this theoretical basis, the treatment of diathermy to the liver was instituted for all types. As a check to the usefulness of the procedure, the earlier cases were divided into two separate groups. One group was treated by rectal diathermy alone; another, by the addition of treatment to the liver. The more rapid clinical improvement in the latter group warranted its further continuance by the following combined method.

Liver Diathermy. Fixation of two equal sized electrodes, 4x6 inches, antero-posteriorly, over the region of liver dullness; the patient lying face downward in order to facilitate better adaptability. The electrodes are held in place by a three inch elastic bandage. The time of treatment is 30 minutes; the amperage is in direct proportion to pleasant heat tolerance of the individual. This may vary considerably in different individuals and hence no definite amperage can be advocated for all.

Rectal Diathermy. The success of rectal diathermy depends upon one's ability to pass a diathermic current directly through the affected hemorrhoid, and the care with which one manipulates the introduction of a metal electrode through a rectal orifice that has become hypersensitive through inflammatory changes. In the majority of the cases, spasm of the anal opening is an associated phenomenon with external protrusions. In a few, the relaxation of the orifice is found to be a great handicap for the retention of the rectal electrode. A technic was adopted that insured against accident. Two types of rectal electrodes were used: one an elongated, flat, pear-shaped instrument that tapered at its base (Figure 1); the other consisted of a series of three different sized aluminum electrodes whose widest circumference was in the middle but constricted at its base, to permit the sphincter muscles to hold it firmly in place (Figure 2). The aluminum electrodes were more easy to introduce in the spastic types, the blunt electrode in the relaxed cases.

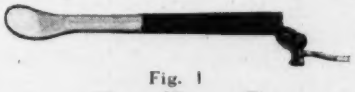


Fig. 1

Fig.2

After determining the location of the hemorrhoid with a Sim's or Kelly rectal speculum, or, preferably with an anoscope, a properly lubricated (K-Y jelly) electrode is introduced, flush against the site of the pile. An elastic bandage is pinned around the lower portion of the abdomen, and the cord is passed underneath this and fastened to the electrode. This removes any possible pull or weight upon the electrode and insures against slipping. The indifferent electrode, 6x8

inches, is placed under the patient's hips if the hemorrhoid is laterally situated. The auto-condensation couch can be used as a convenient indifferent electrode for hemorrhoids situated at the antero-posterior junction. Since mucous membrane is able to tolerate a greater degree of heat than cutaneous tissues, the meter will register a surprisingly high amperage before the patient begins to experience a comfortable sensation of warmth. I have seen no untoward effects with milliamperage as high as 1000 to 1500. I have used on an average 1200 m. a. for each treatment which lasted thirty minutes. In the beginning, greater benefits are derived from daily treatments than those spaced farther apart. I usually proceed with a series of six daily treatments. If there is need for further treatments they are separated according to the individual's requirement and the improvement of the patient. The effect of the diathermy treatment was here as convincing as in the group of cases mentioned in the first part of this report.

Conclusion

The advantages of medical diathermy in certain selected forms of internal hemorrhoids have been repeatedly demonstrated. Experience in comparatively large series of cases has been in accord with that of other workers. While it is appreciated that surgery must be frequently resorted to, careful selection of cases for treatment with medical diathermy will often avert or defer surgical interference. In those patients in whom surgery is for some reason contra-indicated, the method suggested in this paper is a noteworthy advance in hemorrhoidal therapy. The prophylactic management of hemorrhoids has already been referred to in the text. Its importance must be properly evaluated.

30 N. Michigan Avenue.

THE COLON: A FACTOR IN DISEASE

HARRY W. ROTHAM, M.D. and O. BOTO SCHELLBERG
NEW YORK

Attention has long been directed to the colon as a factor in disease. One can readily realize how, with impaired colonic function, that state of well-being which we call *health* can slowly but surely be undermined. No longer may we regard the colon simply as a reservoir for waste materials of digestion. It is a vital organ, and its impaired physiological action may be the underlying cause of many of the conditions we are called upon to treat.

The colon from the cecum too near the splenic flexure is regarded as having absorptive properties; from there on to the rectum it is mainly expulsive in character.

Ordinarily a dried stool contains nearly 20 per cent of bacteria. In conditions of disease this may increase to even 50 per cent. Of these bacteria almost 80 per cent are dead. The predominating organism usually is *Bacillus coli* and among others may be found *B.* welchii, streptococci, staphylococci diplicocci and enterococci. These are the so-called harmless microörganisms of the colon, but any one of them may become the activating agent of a pathological condition. The presence of a large number of hemolytic streptococci is very significant, as is the presence of a large number of staphylococci. Indications of local disorder in the colon are shown not only by bacterial examination of the fecal smear, but also by chemical examination. Cecal contents which normally are only slightly acid are sometimes markedly acid or alkaline, and yet putrefactive products may be present in either case. Extremely severe cases of "autointoxication" frequently show a great acidity of the fecal contents, due in part to the accumulation of hydrogen sulphide, in itself an extremely toxic substance. On the other hand, excessive alkalinity may result from a putrefactive residium, due to the liberation of ammoniacal bases.[1]

Focal infections have always been the bugbear of the clinician. In the search for a possible focus, teeth, tonsils, appendices and gallbladders have frequently been found to be the offenders. But just as often have these organs been examined or removed with no apparent benefit. There is another possible focus, more easily accessible and most frequently overlooked: the intestine. This important fact was recognized by Lane, but the result of removing the entire colon was usually much worse than the disease itself.

Adami suggested that a number of chronic diseases have their origin in a continuous mild infection with *B. coli*, and brought forth evidence to show that such affections as anemia and cirrhosis of the liver may be due to such an infection. Osler likewise believed that colon bacillus infection caused anemia. Following intravenous injections in animals, very marked anemia was produced, with a picture like that of pernicious anemia. Such an infection may be a factor in the causation of severe anemia in the human individual. Metchnikoff[2] actually induced the lesions of cirrhosis and arteriosclerosis by administering the growth of *B. coli*. This organism has been found in peritonitis, appendicitis, salpingitis and other infections of the abdomen and pelvis. In a series of 618 cases of salpingitis collected by Andrews, 6 per cent were caused by staphylococcus or streptococcus, 6 per cent by various saprophytic organisms, and 2½ per cent by *B. coli*. Vallin states that infection may occur directly from the intestine or through lymphatics which lie in the ligaments connecting the right ovary with the appendix.[3] Braithwaite[4] has very clearly shown by a series of experiments that *B. coli* by way of the lymphatics can cause duodenal ulcer, gastric ulcer and cholecystitis. Surgeons very often during operation see coexisting cases of acute appendicitis and acute cholecystitis. Jordan[5] states that the colon bacillus is able to pass from the digestive tract into the blood, whence it may invade the gallbladder and bile ducts and cause cholangitis and cholecystitis. The bacillus is often found in the core of gall-stones.

Cystitis, urethritis and prostatitis are very often caused by *B. coli*. According to some writers as high as 80 per cent of all cases of urinary tract infections are caused by the colon bacillus. Brown,[6] in a series of sixty-five cases of cystitis, reported *B. coli* present in thirty-one, and that 57 per cent of all cases of acute cystitis were caused by *B. coli*. In twenty-four cases of chronic cystitis, fifteen gave pure cultures of *B. coli*. I have seen cases of chronic cystitis which have resisted routine treatment for years, clear up when the intestinal focus was recognized and treated.

Chronic Arthritis

Chronic arthritis is a condition which calls for the most thorough search for possible infective foci. Gastro-intestinal infection is being emphasized more and more, and certain observers have found on bacteriological study a high percentage of streptococcus infection. The principles of treatment should be the removal of the infective cause if recognizable, and stimulation of bodily immunity by every possible means. Every gross focus of infection should be removed. Physical therapy measures should be resorted to as a routine, including massage, heat, baking, ultraviolet ray, colonic therapy and diathermy. Stoner[7] in his series of 140 cases of chronic arthritis used colonic therapy more or less as a routine. The intestinal factor in arthritis is emphasized by Swain.[8] In hypertrophic arthritis there is a large flaccid, distended intestine. In the atrophic type there is often a loose floppy cecum, frequently dilated, causing an incompetent valve, and often colitis. Constant clearing out of the colon is necessary in these cases in order to prevent absorption. Smith[9] says that many of his cases of arthritis were apparently absorbing toxins from the gastro-intestinal tract, and were not benefited by any treatment other than colonic irrigations. High colonic irrigations have given a good result in sub-acute and chronic arthritis in the hands of R. G. Snyder and S. Fineman.[10] It was proven that the cecum may be reached by the tube. This procedure had been described by Galland[11], in 1921, in a paper discussing the treatment of chronic colonic infections by the Schellberg method. The chief value of inserting the tube into the proximal colon is that it appears in some cases to set up greater contractility of the colon. Lane is of the opinion that intestinal stasis may result in toxemia and cause arthritis. Lack of adequate and complete intestinal drainage is undoubtedly responsible for many cases of arthritis. The intestine must be emptied of accumulated residue, the injured mucosa cleaned and treated, so that it may be restored to full functional activity and the energy of the cell promoted.[13]

Cecal Stasis

The gastro-enterologist is very often called upon to treat cecal stasis, and unless proximal colon emptying is improved treatment will fail. Along with other therapeutic measures such as rest, diet, adequate water-drinking, etc., colonic therapy will prove to be of great aid in treating this condition. Kantor[14] finds that a series of gentle but thorough colonic irrigations may remove old residues and start

spontaneous and more effective bowel action. Theoretically, the best form of irrigation would be that in which the cecum is directly tapped and lavaged. In mucus colitis colonic irrigations will be found invaluable in removing accumulations of mucus. Our experience has been that sodium carbonate, 60 grains to the quart, instilled on the right side of the colon, hastens elimination of mucus. Daily treatments are given for one or two weeks, then twice a week for several weeks, and finally once a week. In the treatment of dysentery direct medication to the colon will hasten recovery. This treatment is strongly advised by de Rivas for amebic dysentery.

Case Reports

CASE I. A. F., male, aged 60 years. Admitted in May 1926, to a great western clinic, complaining of marked tenesmus on defecation, twenty to twenty-five loose bowel movements, consisting of blood and mucus, each day. Proctoscopic examination revealed small ulcerations in the mid-portion of the rectum on the right anterolateral wall. Biopsy specimen showed slight inflammatory fibrosis but no malignancy. Laboratory studies at this time were essentially negative. The patient improved with colonic irrigations, ultraviolet light and dietary treatment, and was discharged from the clinic somewhat improved. A few months later he was again admitted to this clinic with his original symptoms of diarrhea, tenesmus and loose, bloody, mucus stools. A diagnosis of amebic dysentery was now made and treatment immediately begun. He was given quinine enemata and emetine hydrochloride, at first hypodermically and later in kaolin tablets. He was discharged January 8, 1927, somewhat improved. All blood studies were normal.

September 15, 1927, he presented himself to us complaining of diarrhea, twenty to forty movements a day, loose, bloody and full of mucus. His physical appearance was one of emaciation; height six feet, two inches; weight 154 pounds (normal weight 190 pounds); blood pressure 106/90; mentally much depressed. A stool examination was done immediately and showed abundant active amebae. The first day his colon was gently irrigated in its entirety; then 60 grains of quinine bisulphide in a quart of water was deposited on the right side of the colon. After each treatment four ounces of a 5 per cent solution of neosilvol at 40° C. was deposited in the rectum to allay tenesmus. The patient remained on his right side during this procedure. Next day he received per colon, following gentle irrigation, 100 grains of neosilvol to the quart of water at 50° C. The third day a solution consisting of a half ounce of icthyol and one dram of kerosene in eight ounces of water at a temperature of 36° C. was instilled into the right colon and hot silver solution allowed to flow into the colon as the tube was withdrawn. On the fourth day three grains of emetine in a quart of water was instilled into the right colon. The emetine, the kerosene-icthyol mixture and the quinine were used in rotation, depending upon the microscopical picture presented by the stool, which was examined daily. At the end of ten days' treatment cultures of *B. acidophilus* were deposited in the cecum. By the fourth day the amebae had become inactive and on each successive day they were less numerous in the microscopical field. They were first totally absent on January 1, 1928, three and a half months after treatment was instituted. By this time the patient was receiving only two treatments a week and sometimes only one. He then weighed 170 pounds, a gain of 16 pounds; blood pressure was 120/80, and he felt a great deal better. His diarrhea had ceased and there was no blood nor mucus present in the stool. On March 12, 1928, he weighed 180 pounds and was still having one formed stool daily, free from blood and mucus. October 10, 1928, about one year after he had begun treatment, he weighed 185 pounds and had normal stools. At the present time, after more than a hundred stool examinations, no amebae are present. The patient now weighs 194 pounds and has regained his old time vigor.

CASE II. J. K., male, aged 49 years, referred July 2, 1926, by Dr. R. G. Snyder, with a diagnosis of arthritis deformans of the spine. Other joints were involved, especially the right knee, which was twice the normal size. He wore a brace around his body for support and, in addition, required the use of a cane to help him walk. He had been suffering for the past twenty years, and was getting progressively worse. He was a lawyer but was unable to practice, due to his marked deformity and excruciating pains. Fecal smear revealed an excessive amount of streptococci, large numbers of *B. coli*, some staphylococci and some *B. aerogenous capsulatus*. He was placed on

daily irrigations with instillation into the right colon of one-half pound of sodium phosphate and one-half ounce of sodium salicylate, in solution, at a temperature of 50° C. On alternating days neosilvol, 50 grains in one and one-half quarts of water, was used instead of the sodium phosphate. After two weeks the fecal smear showed few streptococci, a few staphylococci and many colon bacilli. Sodium acid phosphate was now used in alternation with the other solutions. After fifteen treatments mild catharsis, sufficient to cause easy movements, was given nightly. At this time the acute tenderness and swelling of the knee had subsided considerably. After three weeks one and a half ounces of castor oil was given, and the next day a culture of *B. acidophilus* was instilled into the right colon. The salicylate and sodium phosphate solution was now discontinued and, instead, sodium thiosulphate was used. Treatment was gradually discontinued until only one treatment a week was given. The patient had no pains at this time and was able to move about more easily. About four months after treatment was stopped he suffered a relapse. Both knees now became tender and swollen. But again, after intensive colonic treatment, his symptoms cleared up gradually. Since then he has had three other attacks, each time his fecal smear showed abundant streptococci which quickly cleared up as his colon was treated. This patient undoubtedly has an infective focus in his intestine, and unless his colon is kept well drained, and the streptococci down to a minimum, his arthritis becomes worse. Since he began to be treated in this manner no other joints have become involved, his back has straightened out and he is able to move about without the aid of a brace or cane. For the past three years he has returned to full activity in his profession.

Summary

1. For local conditions of the colon such as cecal stasis, colitis, dysentery, etc., colonic therapy properly applied will prove a great aid.

2. The colon can be an active focus of infection, and this fact should not be overlooked.

Discussion

O. BOTO SCHELLBERG: When I announced that I had been able to pass a tube through the entire length of the colon to the cecum, the accuracy of my statement was questioned everywhere, and openly denied by a large proportion of the medical world. In many minds this attitude of criticism and prejudice still prevails. It has been stated by some of those ranked as leading authorities in physiology and roentgenology that the passage of a tube through the colon for this distance was anatomically and physiologically impossible. The colon was regarded as a fixed tube, all the knowledge at this time in general possession having only been attained by dissection and postmortem inspection. The therapy which I developed was based upon my own observations of the physiological action of the living colon. In order to understand the principles of this therapy a knowledge of this physiological action is absolutely essential. Without such knowledge application of the therapy in an intelligent and scientific way would be impossible.

The colon accomplishes its particular work almost entirely by lengthening and shortening. These changes are governed by the peculiar phenomenon exhibited by the taenia coli bands, which have the ability to shorten and lengthen in co-relation with the circular muscles. The diameter of the colon's lumen varies at different times because of the changes in the dimensions of these muscles. The lumen may even be completely obliterated, if sufficient muscular stimulation is in evidence. Therefore, it is upon autonomous chemical stimulation that the length of the colon at any given time depends.

Not alone does the size of the colon vary; its anatomical position constantly changes because of this stimulative action. At one time the cecum and part of the ascending colon may be very low in the pelvis. But as this portion of the eliminative canal has the ability to rise and deposit its content higher up — sometimes as high as the hepatic flexure — it does not remain constantly at this level, or indeed at any level, inasmuch as when it has deposited its residual content it recedes once more, in this manner transporting a mass through the right colon.

Because of the activity of the mucosal lining of this part of the bowel in absorbing fluid from its content we designate it as *the digestive colon*. Below the splenic flexure the function of the colon becomes more purely motor, losing in large measure the absorptive ability which characterizes the areas higher up. Once past the splenic flexure, the mass

of residue is taken up by a loop which forms in the gut from the same stimulatory action which brought the mass to it. The looping of the bowel carries its content to the rectal ampulla. During this segment of the digestive and eliminative cycle the sacculations previously present on the left side are completely straightened out, permitting the molding of the mass of residue into cylindrical form.

Should some abnormal influence serve to hurry the mass through the absorptive portion of the colon so that the liquid is not taken up by the mucosa as completely as it should be, it will reach the splenic flexure in a fluid condition. Upon this liquified mass the molding is ineffective, and the result is a diarrheal stool.

According to Howell[15] the musculature of the large intestine has the same general arrangement as that of the small intestine, and the consensus of opinion is that the movements are similar also. But inasmuch as the anatomy differs completely, this cannot be possible. Though they work in unison, the physiological action is entirely different. Cannon[16] observed, when employing Roentgen rays, the normal movements in the digestive tracts of cats, and came to the conclusion that the movements in the proximal portion of the large intestine were peculiarly characteristic. The food mass is in a more or less liquid state by the time it reaches this portion of the canal. The presence of this liquid sets up running waves of constriction, passing toward the ileocecal valve. These waves are observable in groups—separated by periods of rest. They seem to originate from a constricting ring, its pulsations starting an anastaltic wave with each constriction. As Cannon's description was taken from Roentgen-ray observation, it is no doubt correct; but as the colon was not visible to him, its action in shortening and lengthening was also beyond his vision. In other words, while he was making these observations the invisible colon was moving in rhythm with its content, executing a worm-like movement. The rings of which he speaks are the formation induced by the action of the taenia coli bands. Thus a ring may form at any point along the canal, and is not restricted to any definite section.

The Roentgen-ray study of the colon is pronounced by Case[17] to be one of the most interesting investigations in the field of diagnosis. Its success, however, is in a high degree dependent upon the skill and experience of the individual radiologist. The Roentgen findings are susceptible to so many plausible but erroneous interpretations that it behooves one to become familiar with the physiological variations of the normal colon. It is especially necessary to observe its motor action in order to comprehend fully the meaning for the findings in each individual case. Roentgen findings such as we must be content with at present, are incomplete. A snapshot of a running horse gives a representation of a physiological action. A moving picture of this same running horse would present extended variations of such physiological action. Until we adapt x-ray photography to the art of the moving picture, it will be impossible to visualize the physiological actions of the colon. They are too numerous to be reproduced by our present methods.

As a step in advance toward this eventuality I have devised a method of making the empty colon impervious to x-ray as it is when filled by the barium meal. This required several days of preparation for thorough and complete removal of all gas and residue. I then prepared the wall with chemicals so that it became opaque to the Roentgen rays, and a clear outline of the empty gut appeared upon the film. Thereafter, a barium meal was administered in small portions, so that the colon was filled divisionally, and, by taking pictures at intervals, a very fair idea of a number of physiological movements was obtainable.

Because of the frequency of the order for a "high, hot colon" irrigation, I was forced to employ three percolators in combination. Therefore, I placed in one a soltuion at 37° C. which I used for passing the tube, while in two smaller tanks I introduced a medicated solution, kept at a temperature of 50° C. When the tube had been passed with a solution at a normal temperature, the first tank was shut off, and hot, medicated solution deposited in the colon. This was the beginning of the technique which I designated as *Colonic Therapy*. It is essentially different from what is known as colon irrigation or enemas.

The apparatus employed for *colonic* therapy may be described as one characterized and in combination with a plural supply of medicaments. There is a flexible delivery tube having a length adapted to extend through the intestine, from the rectum to the lower end

of the ascending colon cecum. At the delivery end of this tube there is provided a means whereby it is permitted to pass through the intervening sphincters. A manually operated, two-way valve intervenes between the tube and the source of supply of the solutions used in it, and there is also a drain disposed for siphonic action upon the tube. This instrument enables an operator to pass the tube through the colon and deposit medicaments and heat in the right colon. Thus, heat is first supplied, then medicaments—the medication being absorbed as rapidly as when given intravenously. Third, the normal physiological action of the colon is stimulated—that is, from right to left. Fourth, medication has been introduced in such a way that it will reach every portion of the lower bowel. Fifth, residue has been forded *out* of the intestine and its absorption prevented. Sixth, by thus passing the tube through the colon, gas is removed and the solution is deposited and finally by slowly withdrawing the tube, the solution is spread all along the mucosal lining of the gut. With such a precise technic we avoid causing any rise of intra-abdominal pressure, with attendant ill-effects which enemas so often produce.

Still another advantage offered by this therapeutic method is the ease with which the tube may be passed and specimens for examination taken from any portion of the gut desired. The ability to secure and immediately examine such specimens is immensely important in diagnosis.

The critics of colonic therapy will probably say that all the advantages enumerated above can be secured just as well by using the ordinary enema. Yet it is likely that any such critic would not even be familiar with the physiological conditions which make it possible for him to force the solutions used in such an enema through the colon. Of the motor function of the colon on the left—of its ability to form loops which permit emptying of its content into the rectal ampulla—he is almost certain to be profoundly ignorant. While the action of this portion of the colon is highly autonomous, we still have a certain amount of control over it. The loops form from above and descend to the rectum. When the ordinary enema is administered it holds the colon in abeyance, the residue in the left colon being forced back into the right side in a liquified state, so that all the injurious products it contains are readily absorbed. The ever-present gas is forced back also, which increases intra-abdominal pressure to an abnormal degree. The normal vigor of the colon is thereby much depleted and its physiological action partially inhibited, and so it is much less active in returning the residue to the motor colon. Permanent injury will very likely result, and such a procedure has induced syncope, shock, collapse and even death—to say nothing of local disability in the organs directly involved. It is plain that the employment of any such technique is to work directly in opposition to Nature. Normal physiological action is hindered or completely halted, instead of stimulated to carry on the digestive function in a natural way.

When one comes to examine the articles written on the subject of colonic therapy which recommend the use of enemas and similar means of treating the colon, it appears that they are composed largely from the results of library research. When shaping such material to his own needs an author is very likely to lose a great deal by the necessary transpositions. Very often the chief points which the earlier writer wished to emphasize are wholly overlooked or neglected by those who believe they are setting forth his ideas in a new form. The only practical therapy of the colon is that based upon its normal physiological action and this is only possible when that action is perfectly comprehended.

References

1. Rothman, H. W.: The Application of Colonic Therapy in Internal Medicine. *Med. Rev. of Rev.*, March 1927.
2. Osler, Sir William: *Modern Medicine*, Vol. 1.
3. Jellet, H.: Practice of Gynecology.
4. Braithwaite, L. R.: Flow of Lymph from the Ileo-cecal Angle and Its Possible Bearing on the Cause of Duodenal and Gastric Ulcer. *British J. Surg.*, July 1923.
5. Jordan, E. D.: General Bacteriology.
6. Brown, T. R.: Johns Hopkins Hosp., *Rev.*, 1905, X, 1-89.
7. Stoner, W. C.: *Jour. A. M. A.*, 1928.
8. Swain, L. T.: *Ibid*, July 1924.
9. Smith, M.: Treatment of Arthritis. *New England J. M.*, Boston, July 1928.
10. Snyder, R. G., and Fineman, S.: A Clinical Roentgenologic Study of High Colonic Irrigations as Used in the Therapy of Subacute and Chronic Arthritis. *Am. J. Roent.*, January 1927.
11. Galland, W. H.: The Schellberg Treatment for Chronic Colonic Infections. *New York Med. Jour.*, 1921.
12. Lane, Sir A.: Paper, Derby Med. Soc., October 17, 1911.

13. Schellberg, O. B.: Lectures on Colonic Therapy, 1930.
14. Kantor, J. L. *et al.*: Cecal Stasis, Its Clinical Appearance and Relation to Proximal Colon Stasis. *Am. J. Roent. and Rad. Therap.*, July 1930.
15. Howell: Text-book of Physiology. 9th ed. pp. 734-735. W. B. Saunders Co., Phila., 1925.
16. Cannon: *Am. J. Physiol.*, vi, 251, 1902.
17. Case, J. T.: Fundamentals in Roentgenology of the Colon. *Am. J. Surg.*, viii, 844, April 1930.

COMBINED DIATHERMY APPARATUS AND TREATMENT TABLE *

A New Space Saving Device

NORMAN E. TITUS, M.D.
NEW YORK, N. Y.

Every physician who employs high frequency electricity appreciates the necessity of good facilities for administering these currents. In addition to a good machine one requires a wooden table or couch on which the patient lies while receiving the treatments. Autocondensation entails a further outlay for a large special pad to fit the length of the table.

As it is not always convenient to keep this pad in place on the table, it has to be kept elsewhere between treatments. The table can be used for various purposes, but a machine serves only for diathermy and consumes a large space. The table and the machine together occupy more space than the average office can spare conveniently.

Without reducing the facilities of a high frequency machine, treatment table, and autocondensation pad, I have devised a combination apparatus which embodies these three features in one and economizes on space. The amount of floor space required is approximately that of the ordinary office examining table (Fig. 1).

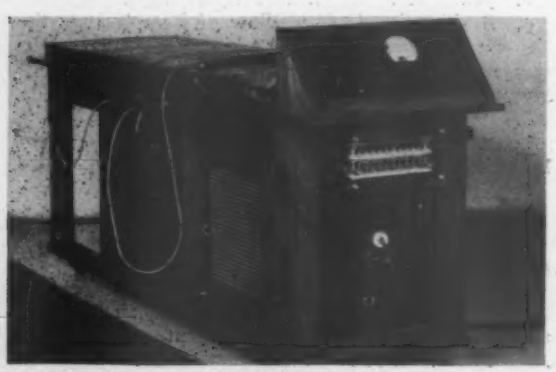


Figure 1. Table with top removed, showing oscillating resonator at left, Leyden jar condensers in the center, high voltage transformer to the right and control on the end.

The measurements allow sufficient length and width for the average person. The cushion which covers the top of the table is specially made for autocondensation purposes. The controls for the apparatus are installed underneath the headpiece which is elevated to provide a support for pillows (Fig. 2).

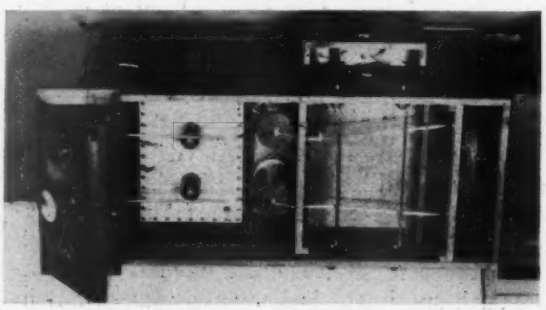


Figure 2. Control end view of treatment table connected for couch diathermy. (Autocondensation).

On one side of this control head-piece there is a very strong cord connected directly to the main switch of the machine. The purpose of this cord is to permit the patient to discontinue the treatment at any time because of sudden discomfort or for other reasons. The cord when pulled acts as a safety switch, shutting off the machine instantly. The terminals of the machine are on both sides of the table, permitting its position to be shifted as necessary. The spark gap likewise has a control on both sides. In the legs at the head end, electrical outlets provide for convenient connection of an infra-red generator, an ultraviolet lamp, or other apparatus.

The terminal for the Oudin current is so concealed under the foot end of the table that it is impossible for anyone to come in contact with it unintentionally. The table also con-

* Presented before the New York Physical Therapy Society, May 7, 1930. To appear also in the *Medical Times*.

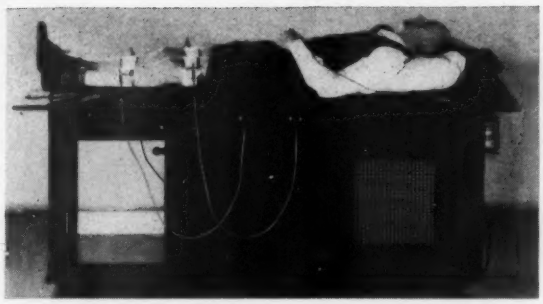


Figure 3. Patient receiving diathermy to both knees simultaneously.

tains two drawers amply large enough for electrodes, appliances, and other sundry supplies.

When the autocondensation pad is lifted off, the top of the table can be removed in three sections. One side of the head part can be opened readily, permitting access to all parts of the machine for repairs or adjustments. Castors fastened to the legs of the table make it easy to move about. As the machine was originally not planned for portable purposes because of the saline-filled Leyden jars, it is not to be moved about without care. While no serious damage would result, a broken jar would delay further use of the machine until repairs were made.

The transformer of this apparatus yields extremely high voltage. The wiring is replaced by copper tubing. It has been found that such connections increase the power of this table model over that of the usual type of machine.

Special diagnostic equipment for urologists or gynecologists can be installed in the table without interfering with its construction. A time switch control, when perfected will be installed. Such an addition is practical and could be arranged in or out of the circuit as desired.

It is the purpose of the manufacturer to produce this combination outfit at a cost not in excess of the cost of the individual pieces which go to make it up.

Hydrotherapy in the Treatment of Syphilis. Thomas N. Black, M.D., and W. M. Blaskshare, M.D., Hot Springs National Park, Arkansas.

Tri-State M. J., **2:6:***333, June, 1930.*

Fever therapy by bathing is contra-indicated in certain types of cardio-renal cases especially cardiac insufficiency and aortitis. Hypertension from arteriosclerosis probably would not fare well in a very hot bath, and all cases of malignancy and tuberculosis should not be subjected to this type of therapy.

In the treatment of our cases we find it an easy matter to develop daily temperatures of 102 to 103 degrees F. Much higher temperatures have been obtained experimentally, but we find that fever above 103 degrees F. probably is too strenuous and leaves the patient in an exhausted state. We believe daily elevations of between 102 and 103 degrees sufficient.

The bathing technique is important. Gradual elevation during the first week of treatment should bring the patient to the higher temperatures. We strive to produce a sublingual temperature of 100 degrees the first day; and each day following we go farther at the rate of about a half degree. Thus at the end of one week we reach the maximum amount of fever. We find that in most cases the tub temperature is 104 degrees when the sublingual temperature reaches 103 degrees. Thirty to forty-five minutes in the tub produces the fever, then the patient is removed to the hot room where the fever is maintained for half an hour then to the second cooling room until the fever is practically gone.

In all, the fever lasts about two hours, reaching its maximum while in the hot room. It is our belief that the rapid elevation followed by rapid fall in temperature influences the life of the treponema more than does prolonged fever. The organism meets with a shock upon the rise and another shock upon the fall. In this state of disturbed equilibrium, the organism falls an easier prey to antiluetic medication.

The Pre-Radium Treatment of Uterine Cervical Malignancy. Harold Swanberg, M.D.

The Radiological Review, Vol. 52, No. 10, Oct 1930.

1. Every case of advanced uterine cervical cancer should receive external radiation and if this is given by high voltage x-rays, it should preferably precede the internal radium treatment.

2. Local infection constantly accompanies cervical cancer and no case should receive internal radium treatment until the infection has been controlled by suitable douches, etc.

3. The principal internal radium treatment should not be given until the uterine canal is patent, as the best results are secured by placing radium the entire length of the canal. If the canal is occluded it should be treated by preliminary radium until rendered patent, or the cervix should be amputated by electro-thermic measures preceding the principal internal radium treatment.

4. Every effort should be made to eliminate sources of focal infection and to improve the general health of the patient.

WILLIAM BENHAM SNOW

(1860 - 1930)

The death of William Benham Snow on Saturday, November 29th, is announced with deep sorrow. Dr. Snow was one of the leading pioneers in Physical Therapy in America, the Editor of *Physical Therapeutics,* and the author of several scholarly books and many articles dealing with physical therapy. He was particularly recognized for his vigorous leadership and his scholarly contributions in static electricity and, no doubt, was the outstanding authority in America in this branch of therapeutics. He rose above the handicap of physical invalidism and became in the past quarter of a century the most virile, intellectual figure in physical therapy. He has left a large army of friends and disciples who mourn his untimely passing with deep sorrow. Condolence is extended to his beloved wife, Mary Arnold, and his children.

ARCHIVES of PHYSICAL THERAPY, X-RAY, RADIUM

OFFICIAL PUBLICATION AMERICAN CONGRESS OF PHYSICAL THERAPY

Editor: DISRAELI KOBAK, M.D., CHICAGO

EDITORIAL BOARD

MEDICINE—NORMAN E. TITUS, M.D., *New York;* F. H. EWERHARDT, M.D., *St. Louis;* E. N. KIME, M.D., *Indianapolis;* CURRAN POPE, M.D., *Louisville;* J. C. ELSOM, M.D., *Madison;* EDGAR A. MAYER, M.D., *Saranac Lake;* CHAS. E. STEWART, M.D., *Battle Creek;* HARRY EATON STEWART, M.D., *New Haven;* J. U. GIESEY, M.D., *Salt Lake City;* Benjamin Goldberg, M.D., *Chicago.*

SURGERY—WILLIAM L. CLARK, M.D., *Philadelphia;* GUSTAV KOLISCHER, M.D., *Chicago;* JOHN S. COULTER, M.D., *Chicago;* A. D. WILLMOTH, M.D., *Louisville;* F. H. WALKE, M.D., *Shreveport.*

EYE, EAR, NOSE AND THROAT—A. R. HOLLENDER, M.D., *Chicago;* F. L. WAHRER, M.D., *Marshalltown;* IRA O. DENMAN, M.D. *Toledo;* ELLIS G. LINN, M.D., *Des Moines;* F. B. BALMER, M.D., *Chicago.*

X-RAY AND RADIUM—A. F. TYLER, M.D., *Omaha;* R. W. FOUTS, M.D., *Omaha;* HARRY H. BOWING, M.D., *Rochester, Minn.;* R. E. FRICKE, M.D., *Rochester, Minn.;* R. T. PETTIT, M.D., *Ottawa, Ill.*

BIOPHYSICS—ALBERT BACHEM, Ph.D., *Chicago.*

BIOCHEMISTRY AND NUTRITION—VICTOR E. LEVINE, Ph.D., M.D., *Omaha.*

FOREIGN COLLABORATORS—ELKIN P. CUMBERBATCH, M.A., M.B., (Oxon) M.R.C.D., *London;* GUIDO HOLZKNECHT, Dr. Med., *Vienna;* A. ROLLIER, M.D., *Leysin;* ALBERT E. STEIN, Dr. Med., *Wiesbaden;* AXEL REYN, M.D., *Copenhagen;* CARL SONNE, M.D., *Copenhagen;* FRANZ NAGELSCHMIDT, Dr. Med., *Berlin;* DR. JOSEF KOWARSCHIK *Vienna;* SIR HENRY GAUVAIN, M.D., M.Ch., *Alton, Eng.;* A. R. FRIEL, M.A., M D., (Univ. Dub.), F.R.C.S.I., *London.*

EDITORIALS

The Editor, the Editorial Board and the publication committee extend

Season's Greetings

and sincerely wish the fellows of the Congress and the subscribers to the Archives

A Merry Christmas

and a

Very Happy New Year

THE SPIRIT OF RESEARCH

The yuletide season is again upon us and the spirit of happy new year felicitations is in the air. Under such circumstances one should be inclined to relax for the moment from the rigorous pursuits of medical competition and permit one's mind to wander over the more inspirational trails made, for example, by the pioneers of science. Attention is purposely directed to this topic because of the relationship that exists between the physical sciences and physical therapy, and to stimulate renewed interest in scientific contributions that have as their basis the unselfish pursuit of Truth.

A survey of the literature in physical therapy during the passing year of 1930 shows that there has been no apparent depression in literary activity. Our yearly Physical Therapy Index, published elsewhere in this issue, is a confirmation of unusual fertility in this direction. But while it points to greater literary industry and perhaps to a reawakening interest in these agencies by the medical profession, the quality of these contributions has not reached the high standard of perfection that has been secretly hoped for by those interested in the progress of this specialty. Among the many reports published in this section are to be found contributions suggestive of great originality and of unquestioned scientific worth. It is difficult to comment on such work because it often requires the unbiased opinion of Time to confirm its real value. One, however, secretly wonders whether the modern generation of *furore scribendi* is not often prompted by personal gain as by unselfish sentiments of "truth for truth's sake." No doubt other generations have leveled the same criticism against their own times, and were forced to suspend judgment because of lack of perspective.

Many an outstanding contribution in the past has been condemned because it was in principle a revolutionary departure from the popular concepts of the day. Because of lack of perspective many of the outstanding discoveries in science have gone through the fire of severe criticism and persecution, to be finally accepted for their true worth. By the same token the fame of many a false prophet in science was eventually reduced from the heights of his false claims to the level of his contribution by the judgment of posterity. Time is a great leveler, and mankind is both generous and just in its tribute to the dead. It frequently canonizes those that it has persecuted in life by raising monuments to their memory and placing laurel wreaths on their tombstones. History is full of many such examples.

French peasants were wont to murmur in commiserating tones as they passed at early dawn and at the close of the day the bent and immovable figure of a man seated on a stone in an attitude of deep concentration. They had seen him on many occasions in the same position, scanning for hours the ground before him. As they passed him, they crossed themselves and whispered, "poor innocent (*pé caire*!)." Fabre, the brilliant naturalist patiently observing the actions of insects to discover whether they had instinct and reason, was to the peasantry of France an insane man, and therefore an object of pity.

A large assembly of curious onlookers and members of the University of Pisa were gathered one morning in the year 1591 in the space at the base of the leaning tower, remarkable for its beauty and physical curiosity. A young professor had painfully climbed the spiral staircase until he had reached the gallery surrounding the seventh tier of arches. He saw below him countless faces gazing upward. Many were curious, many were hostile. He balanced two iron balls on the edge of the gallery, one weighing 100 pounds more than the other. The balls were seen to be released at the same time, and were observed to fall and strike the ground simultaneously. The experiment was an answer to the question that had been debated for more than two thousand years. "This meddlesome man, Galileo, must be suppressed," said the University fathers, as they gathered together following the experiment. "Does he think that by showing us that a heavy and a light ball fall to the ground together he can shake our belief in the philosophy which teaches that a ball weighing 100 pounds would fall 100 times faster than one weighing a single pound? Such disregard for authority is dangerous and we will see that it goes no further." Galileo's reward in his old age was imprisonment by the Inquisition. It took over two hundred years, (1591-1822), to convince the whole theological world that cosmic problems were the legitimate problems of science.

The story is told by Lecky, in the introduction to his *Democracy and Liberty*, that such

an erudite man as Gladstone failed to appreciate the value of Faraday. When the latter attempted to explain to Gladstone one of his important new discoveries in science, Gladstone's comment was, "But, after all, what use is it?" "Why sir," replied Faraday, "there is every probability that you will soon be able to tax it!"

That a cultured man like Gladstone did not recognize the greatness of his scientific contemporaries has its parallel in the inquiry by Louis Philippe, king of the French, "Who is Cuvier?" when informed that the most illustrious man of science was dead. "Monsieur Cuvier? I believe that he was one of the gentlemen employed at the Jardin des Plantes," was the courtiers' response. A similar story is told of Napoleon, III, the last emperor of France, when a German guest had begged to be introduced to the eminent physiologist, Claude Bernard. "Claude Bernard? Who is Claude Bernard?" the emperor asked. "He is the most distinguished savant in your majesty's dominions," was the reply. Truly, the scientist has no honor in his own country. The illustrious Fabre was pitied by the peasants as an imbecile; Galileo was imprisoned as a dangerous iconoclast; Faraday, the most valuable scientist in the British Empire, failed to glory of holding aloft among the nations the Premier of the empire.

Tyndal's evaluation of Faraday is of interest. "Taking the duration of life into account, this son of a blacksmith and apprentice to a bookbinder, had to decide between a fortune of $750,000 on one side and his undowered science on the other. He chose the latter and died a poor man. But his was a glory of holding aloft among the nations the scientific name of England for a period of forty years."

Many a biographer and commentator has attempted to analyze the motives that have prompted such men to neglect personal dangers, to exchange immediate fame for hostile criticism, to sacrifice worldly comforts for frank hardship, and riches of poverty. The platitude attributed to Frederick the Great probably comes closer to interpreting the force that secretly motivated the extraordinary labors of our scientists; namely: "The greatest and noblest pleasure which men can have in this world is to discover new truths; and the next is to shake off old prejudices."

The spirit of research has fearlessly attracted many sincere investigators to the difficult and unchartered problems in Science; and all have murmured as did Pasteur: "When I am in my laboratory I begin by shutting the door on materialism and spiritualism; I observe facts alone; I seek but the scientific conditions under which life (or phenomena) manifests itself." It is not by theory and speculation, nor by prayer and philosophizing that conquests in Science have been made. Patient observation, persistent inquiry and the constant accumulation of minute facts—all of this has entered into the formula of modern discoveries.

"The world little knows," says Faraday, "how many of the thoughts and theories which have passed through the mind of a scientific investigator have been crushed in silence and secrecy by his own severe criticism and adverse examination; that in the most successful instance not a tenth of the suggestions, the hopes, the wishes, the preliminary conclusions have been realized." This confession from one of the inspired scientists of modern times, stated with the eloquent simplicity of a worshipper at the shrine of Truth, strikes a responsive chord in all sincere workers in Science. All great men of science have left to posterity the heritage of their unselfish labors; but of greater value is their inspiring influence which seems to mellow with the passing years. Through physical and mental suffering, through poverty and self-abnegation these intrepid pioneers have blazed the trail for the benefit of future generations. Such is the Spirit of Research.

MODERN TREATMENT OF CORNEAL ULCERS

In the opinion of those who have had adequate experience with it, ultraviolet irradiation represents a notable advance in the treatment of corneal ulcers. The carbon arc lamp of Zeiss, a special constructed lamp for treating ulcerations of the cornea, has been in use for some time, but only recently has been experimented with in this country. The water-cooled mercury quartz lamp is employed by some ophthalmologists. By means of a fine pencil quartz applicator it is possible to irradiate an ulcer of the cornea.

Ultraviolet rays and light rays affect the different structures of the eye in various ways. Duke-Elder[1] has written on this subject and calls attention to the fact that the cornea ab-

sorbs completely all heat waves longer than 20,000 A. U. The lower limit of transmission may be taken as 3000 A. U., the rays below this being responsible for exciting inflammation of the cornea and conjunctiva, the most potent being from 3000 to 2500 A. U. Above the 3000 A. U. an increasing percentage of the rays is transmitted to the underlying lens and iris. Below 3200 A. U. all radiations are absorbed by the lens. Above 3500 A. U. the amount absorbed diminishes till the level of 4000 A. U. Above this the rays are transmitted by the lens and reach the retina.

In irradiation of a corneal ulcer with ultraviolet, care must be taken that the rays do not reach the lens. It is said that cataract may result from careless exposure of the eye, and while the effect is not necessarily immediate, definite opacity of the lens has been observed at a time subsequent to irradiation when other systemic factors favor such a change. Burge[2] has demonstrated that if a lens after exposure to ultraviolet which left it still clear, be immersed in certain salt solutions which left the normal lens unaffected, it turned opaque.

There seems to be some controversy on this phase of the subject. Some writers contend that no deleterious influences have been observed, either immediately or later, when the eye has been irradiated with ultraviolet. The point to consider is the source of the irradiation. The Birch-Hirschfeld lamp is especially constructed for eye work and has been so regulated in its construction that prolonged irradiations can be given without ill effects. In fact, one investigator reports giving five to seven minutes irradiation daily for several seances. Such technic could not be adhered to with the water cooled quartz lamp without harmful reaction. The differentiation of sources of ultraviolet for therapeutic purpose is important and gives to the first time reader or listener such specific information as is required for correct application of light energy.

An interesting account of the ultraviolet treatment of *Ulcus serpens* by Gasteiger[3] states that in 75 cases ultraviolet proved successful in 92 per cent, while 20 per cent of the affected eyes were lost in cases that were not irradiated. Gasteiger's method consists of sensitizing the ulcer to ultraviolet with fluorescin or Rose bengole. The Birch-Hirschfeld lamp is used twice daily for five to six months.

Birch-Hirschfeld[4] reports over one thousand cases of corneal ulcer, extending over a period of more than ten years, treated by ultraviolet rays. He uses a carbon arc lamp of 5 amperes, with a quartz lens, uviol glass, and a quartz bulb with sulphate of iron to absorb the heat rays. The ultraviolet rays are focused on the ulcer and an irradiation from three to six minutes is given once or twice a day. The number of applications and their frequency depend on the severity of the ulceration. Fluorescin is employed to sensitize the lesion to the ultraviolet, the wave length of which is regulated between 2800 A. U. and 3130 A. U.

In this country the Birch-Hirschfeld lamp has not been used extensively, but reports have been current of the application of ultraviolet for corneal ulcers. Ophthalmologists have had freer access to the water cooled quartz lamp from which by means of a fine quartz rod they have been able to focus the rays on the corneal lesion.

Nugent[5] reviews the classical methods of treatment for corneal ulcers and remarks that in his hands, during a period of two and one-half years, ultraviolet has proved far superior to other local therapy. According to this worker, if properly applied, it is all that is necessary for the local treatment of any form of ulcer of the cornea." While Nugent appreciates that this is a broad statement, his results in ulcers of nearly every variety, substantiate it. The Birch-Hirschfeld lamp of Zeiss was used.

Nugent believes that healing of corneal ulcers can be effected by this method without the necessity of curettement or cauterization. This is in agreement with the observations and results of other ophthalmologists. In view of the successes achieved in the management of corneal ulcers by ultraviolet therapy, the method merits wider usage. The field for further research of this interesting problem is a large one. The work already performed should stimulate workers to more intensive investigation. The mere fact that the progressive ophthalmologist is looking on with profound interest is in itself an indication that he sees in ultraviolet an aid of distinct value in ophthalmic treatment.

References

(1) Duke-Elder—*Lancet*, **1**:1937, 1926.
(2) Burge — *Amer. Jour. of Physiol.*, **39**:335, 1916.
(3) Gasteiger, *Klinisches Monatsblatt für Augenheilkunde*, No. 3, 1929.

(4) Birch-Hirschfeld—*British Journal of Actinotherapy*, October 1927.
(5) Nugent—*Arch. Physical Therapy, X-ray-Radium*, Vol. II, No. 11, 1930.

LARYNGEAL TUBERCULOSIS WITH SPECIAL REFERENCE TO ULTRAVIOLET THERAPY

There have been frequent articles in American and European medical literature concerning the use of natural and artificial heliotherapy for laryngeal tuberculosis. The enthusiasm of some of the writers has prompted an increased effort on the part of laryngologists to investigate the merits of irradiation treatment for a disease which has resisted the older methods. The difficulty of accurately gaging progress because of the pulmonary involvement and its ravaging influences handicaps the scientific observer and occasionally detracts from an enthusiasm which has been constructed by favorable reports of less scientific workers.

Practically all laryngologists and sanitarium physicians are agreed that heliotherapy has a definite place in the management of tuberculosis of the larynx. The problem which confronts these workers is the selection of the correct procedure of application. That natural sunlight is not a practical means of irradiation because of its variance in different regions is accepted fact. Local irradiation has been carried out by the use of reflected light, and in some instances the effects from this plan have been reasonably satisfactory. Those most experienced prefer artificial irradiation from carbon or mercury quartz lamps because the time and frequency of treatments can be uniformly controlled and because in general the method is more practical and in harmony with modern therapeusis.

Mayer[1] has used for local exposure of the larynx both reflected and direct ultraviolet radiation. He believes that focal reactions are more readily obtained by direct exposure. Two types of apparatus are employed, one a direct source mercury quartz water cooled lamp of 35 volts, D. C. similar to the Kromayer lamp, and the other the standard water cooled lamp through the attachment of quartz applicators. The period of treatments is gradually increased from thirty seconds to fifteen minutes, the increase being about one to two minutes at each exposure. The laryngeal lesion is closely observed for local reaction, which serves to indicate how rapidly the period of exposure may be increased. The conclusion of Mayer was that those patients who developed focal reactions to irradiations showed the greater tendency to heal. Acute laryngeal tuberculosis is considered a contraindication for light therapy. All patients treated receive both general and local applications of ultraviolet rays.

Strandberg[2] contends that general exposures of the body will produce results in those cases of laryngeal tuberculosis in which improvement is possible. As Mayer states, "his results are remarkable but they must yet be substantiated." Of a large series of patients treated by Strandberg, a large percentage regained their full vocal powers; a good number showed improvement; and in only a few cases did the voice fail to show favorable change.

Plum[3] likewise recommends universal carbon arc baths accompanied by palliative operations. Statistics of 163 cases are distributed as follows: 55 percent cures, 7 percent very much improved, 12 percent improved, 26 percent not changed or made worse.

The question now to be answered is whether local or general irradiations are most efficient. Mayer supplemented his local treatments by general exposures, evidently not regarding a possible contraindication of light therapy because of pulmonary disease. From Strandberg's observations, as well as from the observations of others, Mayer believes that the general light bath must be given due consideration as a valuable therapeutic agent in tuberculous laryngitis, but emphasizes the necessity of further verifications. Because of Mayer's experience that a combination of both local and general irradiation is the most desirable form of treatment, the problem has become an open one and leaves much room for controversy until other investigators report their results. The experience of Glenn is limited to local irradiations of the larynx, no mention being made in his communications regarding general exposure to the ultraviolet rays.

If the results of those who have utilized the solar laryngoscope and others who have concentrated on local therapy are favorable, the conclusion will have to be that local action is also effective. The difficulty in comparing results is to some extent due to the different sources of energy employed. Strandberg's

work with carbon-arcs has been duplicated by Plum and a few English laryngologists, while in this country the sources for the ultraviolet energy have been either from the sun itself or from mercury quartz burners. Until some standard source is agreed upon for giving maximum efficiency, the matter of local and general irradiations necessarily will remain controversial.

One thing is certain, heliotherapy will continue to be an important aid in the treatment of laryngeal tuberculosis. Laryngologists cannot disregard the results reported from various sources. According to Spencer,[4] heliotherapy is just now very popular for the treatment of laryngeal tuberculosis and much of this popularity seems justifiable. This writer believes that it occupies an important place in our armamentarium.

Light therapy of laryngeal tuberculosis should not be depended upon to the exclusion of other remedies. In fact only selected cases should be treated by this energy. Cognizance must be taken of the work which is being done with the galvanocautery. This, of course, assumes quite a different indication. That some of the older procedures, too, are not altogether without some merit is to be appreciated.

Laryngeal tuberculosis will always continue to be a difficult disease to treat. The laryngologist fully aware of this and alert to the newer procedures, will at least endeavor to give those patients so unfortunately afflicted the benefits of modern research. This pertains particularly to the utilization of physical therapeutic methods.

References

(1) Clinical Application of Sunlight and Artificial Radiation. The Williams and Wilkins Company, Baltimore, 1926.

(2) Heliotherapy and Artificial Light Treatment of Tuberculosis Conditions and Particularly Laryngeal Tuberculosis. *J. A. M. A.*, July 30, 1927.

(3) The Treatment of Larynx Tuberculosis, With Particular Regard to the Prognosis, by Means of Light Baths. *Zschr. f. Tb.*, 1927, 49, 2.

(4) Laryngeal Tuberculosis. J. B. Lippincott Company, Philadelphia and London, 1927.

The Building Up Of An Atom

Professor William D. Harkins, of the University of Chicago, reported on April 9 to the American Chemical Society, which is meeting at Atlanta, Georgia, that after seven years of experiment he had succeeded in building up an atom. He had had to take 34,000 photographs of the alpha particles of helium passing through nitrogen gas at the rate of 11,000 miles a second before he was able to get two which showed direct impact of helium atoms with nitrogen atoms, and the outcome of that collision and merger—namely, the formation of fluorine for an instant, and an explosive throwing off by the fluorine of an atom of hydrogen, leaving oxygen as the result.

Professor Harkins explained that he had been led to attempt the synthesis by a study of the atomic weights of the ninety-one known elements, which had shown him that the most stable and abundant were those in which the atomic weight was a multiple of four. As four is also the weight of the alpha particle of the helium atom cast off by radioactive metals during their disintegration, it occurred to him that he might be able to reverse the process of disintegration by shooting cast-off alpha particles of helium against other elements.

He selected the alpha particles of helium cast off by thorium for his experiments, admitting about twelve of them at a time into a glass cylinder filled with nitrogen gas and supersaturated with water vapour. As the alpha particles tore through the gas they electrified it in their path, and the water vapour condensed in each path like a thread of steam. Each of these threads was made visible by powerful illumination, and a photograph was taken of them.

Each photograph showed on an average twelve of these alpha tracks, but not until 10,000 photographs had been taken did any plate show one of the tracks stopping abruptly and splitting into two tracks, which revealed by their thickness, length, and direction the masses of two bodies which had produced these. Their mechanical characteristics made it possible to identify these bodies as oxygen and nitrogen. Nearly 24,000 other plates were exposed by Professor Harkins before he once more obtained a photograph showing the direct impact of a helium atom and a nitrogen atom within the field of the camera.—*The Times.*

QUERIES AND CLINICAL NOTES

Q. Which of the physical agents are useful in varicose ulcer of the leg?

A. Infra-red radiation has been utilized with marked benefit in varicose ulcers. Some prefer to adhere to this one agent while others claim that improved results sometimes occur from the combined irradiations of infra-red and ultraviolet. Indolent ulcers which epithelialize slowly because of impoverished local circulation should not be overstimulated by any means because a too rapid growth of granulation tissue is not always desirable. Fuhs prefers a weak irradiation with the air cooled quartz lamp associated with cauterization of the ulcer by fulguration. Diathermy may be employed to improve the circulation of the leg, and when the blood flow is improved with consequent improved nutrition of the adjacent tissue, healing of the ulcer is more prompt. The infra-red is a good means of aiding local nutrition of the tissues and its use is decidedly popular in the hands of practitioners who have no other physical facilities than this. Certainly the added application of ultraviolet as suggested should prove beneficial. The stimulating effect from small doses of x-rays, on granulation and epithelialization has not been found to be uniformly successful.

Q. What are the common skin doses of ultraviolet radiation in regard to degree of reaction?

A. This question can be answered in several ways because no two authors confine themselves to the same descriptions. In the absence of a standardized and accepted plan of dosage, the alternative is to seek for authoritative opinion. Stewart classifies the three different skin doses as: *stimulative, regenerative* and *destructive*. He describes them thus:

"A *stimulative* erythema is the creation of a faint blush after a short treatment at average distance. This produces superficial capillary engorgment, stimulates surface epithelium and is the degree used for most treatments.

"The *regenerative* dose induces a deeper redness just short of blistering. It is destructive to surface cells and produces marked capillary engorgement with considerable absorption of rays. This dosage is used in most widespread inflammatory skin diseases and for cavity work.

"The *destructive* dose induces blistering and vesication of superficial layers of cells, entirely destroying them, but the deeper layers of the skin are stimulated to multiplication and growth. Its use in infective and hypotrophic skin lesions gives us the desired sharp, intense localized result."

Q. What are the effects produced by manual massage?

A. Some authors group the effects of massage under two distinct heads: *reflex* and *mechanical*. Different effects can be obtained by different movements. Reflex effects may result from sedation or stimulation of the sensory nerve endings. The tonicity of muscle can be improved by massage if the correct forms of manipulation are employed. It is said that mechanically massage is capable of returning fluid from the fixed tissues to the general circulation. This involves also the lymphatics, though the extent can not easily be worked out by any present methods.

This subject of the effects of massage cannot justly be discussed in brevity. The inquirer would therefore do well to review the article published by the Council on Physical Therapy, in the *J. A. M. A.*, June 21, 1930. Vol 94. No. 25. This article is so comprehensive that every phase is covered on the physiology of massage. Bibliographical references serve as leads to further sources of information should the inquirer require them.

Q. What is the present method of treating specific urethritis with diathermy?

A. Numerous reports in the literature elaborate on this subject, but Shohan published a comprehensive article in the August issue of *The Urologic* and *Cutaneous Review* (Vol. 34, No. 8). Shohan writes: "The high frequency current has been applied to the urethra by means of penile clamp electrodes, water

electrodes, and other such devices. Besides the evident inadequacy of this technique, its greatest shortcoming is that at best the current is transmitted to the penile urethra only."

The author's method is as follows:

After the bladder is emptied, the patient is placed on his back with a large metal electrode under his buttocks. A soft, saline, electrically conductive clay is then used to fill in the entire space between the lower electrode and the pubis. The clay is made to mold itself into thigh and groin spaces, comfortably but firmly imbedding within it the entire penis and scrotum, and reaching about two inches above the pubis. Thus an electrically conductive mass is formed, of which the urethra is part. The upper surface of the mold of clay is then covered by two thicknesses of salt solution-moistened felt.

Upon this felt a small metal electrode is placed, and is held in place by a light sandbag.

A diathermy machine, generating four to six amperes with the patient in the circuit, is necessary to produce the desired heat. In about twenty minutes the intra-urethral temperature is raised about eight degrees F. This temperature is readily maintained for another forty minutes, making the duration of the entire treatment one hour. Obviously, the temperature of the clay is somewhat higher than that within the urethra, but it need never approach the skin tolerance of the patient.

The treatment is administered with entire safety, and with comfort to the patient. In fact, the suffering patient always experiences his first relief from painful symptoms during his first treatment.

The body temperature shows an increase of about one degree during the treatment. Immediately after the treatment there is usually an increased urethral discharge. The urine voided immediately after the treatment, particularly the second glass in severe and chronic infections, shows marked increase of turbidity and shreds, as compared with that voided before treatment.

Q. Has light treatment of tuberculous peritonitis proved beneficial?

A. A paper in the October issue of the *British Journal* of *Actinotherapy* and *Physiotherapy* deals with this subject. The author, Ole Chievitz, states: "There is no doubt that the light-bath treatment is a valuable addition to our treatment of tuberculous affections. It can be applied either by direct sunlight, notably in mountain health resorts; or, in the less fortunate lowlands by means of artificial light-baths."

At the Finsen Light Institute the technique employed is the one described by Reyn, Collins and Christensen. (*Acta rad.* IV., 4, 1925). "For two recumbent patients (stripped) three carbon arc-lamps with a continuous current of 55 volts and 20 amps are used. If the patients are very poorly, they are at first given general light-baths for not more than a couple minutes, gradually rising to one hour's exposure, three times a week. If they can stand the irradiation without getting tired, the duration of the light-bath is gradually increased up to 2½ hours—as is our practice in the case of patients with tuberculosis of bones and joints.

"The effect of the light proper is not known, although the theories advanced on the subject are legion." Chievitz is of the opinion that intrinsically it has no specific anti-tuberculous effect. He rather considers that it improves the general health and hence increases the patient's resistance against the infection.

Q. What are the effects of ultraviolet therapy on secondary anemia?

A. In concluding his remarks on "The Effect of Mercury Vapor Light Irradiation Upon the Vascular System", (*Arch. Physical Therapy, X-Ray, Radium,* 10:533, Dec. 1929). H. H. Perlman says: "Generalized exposures from a mercury vapor quartz light air-cooled lamp is of definite value in treatment of secondary anemia which occurs during the course of or caused by malnutrition, chronic bronchitis, infantile rickets, esophageal stenosis, laryngeal stenosis, eczema, bronchiectasis, intestinal parasites, nephrolithiasis, pylorospasm and enterospasm.

"In the series of cases studied the hemoglobin, red blood cells, white blood cells, polynuclears, small and large lymphocytes were increased in numbers. The transitional and eosinophile cells remained unchanged, in most patients.

"Contrary to recent investigations of artificial heliotherapy upon the vascular system generalized exposures using the technic outlined in this paper for periods of thirty minutes does not appear to materially depress the various blood cellular elements, but stimulates

their numbers. The last mentioned statement holds true in regard to the hemoglobin.

"The simple technic and ease of administering artificial heliotherapy to the young, renders the comparatively newer method a distinct therapeutic advance of treating patients, the subjects of secondary anemia."

Q. What are the therapeutic indications for external heat?

A. Pemberton and his associates attempt to answer this question in a discussion of the influence and therapeutic use of external heat (*J. A. M. A.* Oct. 8, 1927). The full text bearing on the question is quoted *ver batim:* "The therapeutic indications for the use of external heat can be grouped under the two general headings of general exposure and local exposure, according to whether a systemic or a local effect is desired. Systemic effects find their application for the most part in medical as contrasted with surgical, conditions, and are valuable chiefly in the following disease states or syndromes: nephritis, acute or chronic; arthritis and rheumatoid conditions, in which either local or systemic heat or both may be used; and neurologic conditions, including neurasthenia, functional psychic disturbances and the true insanities.

The therapeutic indications for the use of heat locally are chiefly in the following fields: surgery, especially orthopedic, following fractures, dislocations, sprains, cicatrization after operative procedures and the like; arthritis, when a limited influence on a joint or joints is desired; and certain dermatologic conditions, in which a destructive influence is desired. Another disease state in which local heat has been alleged to have value is pneumonia. The form of heat known as diathermy has been advocated."

Q. Is the Roentgen Treatment of Exophthalmic Goiter a successful means of treating the disease?

A. It is difficult to pass on this one way or the other. There are two schools of thought and doubtless the one opposed to surgery prefers the Roentgen method. It would appear that the management of exophthalmic goiter is strictly one which is dependent on the indications of the individual case. An abstract (*J. A. M. A.* Vol. 95, No. 4) of an article by Jugenburg (*Strahlentherapie,* 36:491, May 1930) is quoted herewith and may be enlightening: "Jugenburg states that exophthalmic goiter in middle-aged women is characterized by a particularly severe course. The disturbance in the equilibrium of the endocrine system is caused by changes in the ovaries, in the thyroid and in the hypophysis. The author's method of radiation treatment of women in whom exophthalmic goiter appears after the age of 40 consists of irradiation of the thyroid, thymus and hypophysis. In cases in which improvement is not noted following the first series of irradiations of the thyroid, the hypophysis is irradiated. Irradiation of the hypophysis is in dicated also in younger women with exophthalmic goiter in whom as a result of some physiologic process (pregnancy) there is a hyperfunctioning of the hypophysis."

PHYSICAL THERAPY CLINICS

ULTRAVIOLET PROPHYLAXIS

ALBERT BACHEM, Ph.D.

Professor of Biophysics,
University of Illinois, College of Medicine

CHICAGO, ILLINOIS

The therapeutic value of ultraviolet light is appreciated more and more. A great number of diseases are treated by ultraviolet radiation, either exclusively or in conjunction with other therapeutic measures. It is of interest to consider whether some of these diseases could not be prevented by ultraviolet exposure inasmuch as they are improved or cured by ultraviolet treatments.

I should like to take up this task with you on this occasion and to study with you the prophylactic properties of ultraviolet.

Ultraviolet is used for the treatment of several skin diseases. The effect is partly local, by the prolonged hyperemia that is produced, by the improved circulation and nutrition, by an increased acantosis and keratosis, which cause a thickening of the protective layers of the skin, by bactericidal power, etc. Partly it is due to a systemic effect, either directly to the autonomous nervous system, or indirectly over the production or stimulation of enzymes. The resulting changes of the innervation, circulation and blood chemistry may be effective in the improvement or the cure of the disease. It seems to me that the same local and systemic effects if caused prophylactically, should even prevent the outbreak of these diseases.

As an illustration let me give you an example in my family. In the winter of 1929 my daughter who is four years of age developed a universal, infantile eczema. Several exposures of ultraviolet were required to arrest the disease, and a few more exposures effected a cure. In the summer before that winter, in 1928, she had very little sunlight; on account of an addition to our family, we could not go to the beaches and we could not go to a summer resort. In other years, particularly 1927 in Germany, she had considerable ultraviolet and did not develop any sign of an eczema. This summer we had plenty of sunshine; this winter we will have an ultraviolet lamp, under which the children will play, and it would disprove my theory, if one of them would develop an eczema.

Ultraviolet is used for the treatment of psoriasis. The new formations respond easily to treatments, while old patches at the elbows, ankles, etc., are very resistant and may better respond to x-ray treatments. The difficulty in the treatment of psoriasis is the danger of new outbreaks if one starts with strong local treatments or general exposure of large areas. In the beginning of the disease, these difficulties do not arise, and it is logical to assume that it is still simpler to prevent the disease by prophylactic ultraviolet exposure.

Ultraviolet is second to x-ray in the treatment of acne vulgaris. The bactericidal effect as well as the causing of an erythema may be of importance. The more the disease has progressed, the more difficult it is to cure by ultraviolet. It seems doubtful, however, whether the same reasoning can be entertained. The cheeks and forehead are predilection sites for the disease, and these areas are usually more exposed to light than other parts of the body. Furuncles and carbuncles occur particularly in areas which are exposed to friction. Ultraviolet causes erythema, edema, increased blood and lymph circulation, improved phogocytosis, etc. Prophylactic treatment would harden the skin more by increased proliferation of the stratum spinosum and corneum. Many observers agree that a skin accustomed to much ultraviolet exposure is much more resistant to infection. This leads to the suggestion that regular ultraviolet exposure will protect against other infective

diseases like Sycosis, Trichophytia, Eczema Marginatum, which are very stubborn against any treatment methods, but may be easily prevented by prophylaxis.

This prophylactic seasoning of the skin would also decrease the chance of a T B infection of the skin such as lupus. *Besides,* there is a general effect of ultraviolet, which increases the resistance toward infections, partly by the mobilization of enzymes, partly over the autonomous nervous system. This strengthens the second line of defense against lupus, and it is of great value in the combat of other kinds of tuberculosis. For the ultraviolet treatment of tuberculosis one has to render the patient accustomed to the treatments by very gradual increase of exposure, from mild irradiation of parts of the body up to strong treatments of the whole body. Extreme care is required to prevent a breaking down of the demarcation zone, which would cause new infections, and might lead to haemoptysis. Too heavy treatments would also cause toxemia with a resulting nephritis. Many patients are in a very poor condition when haemoptysis, fever and nephritis are present. It is very difficult to judge the correct technic for such cases. Some authorities refuse to treat patients presenting these complications. All these difficulties are not encountered in the preventive treatment of tuberculosis. Large doses are not required to mobilize the "vis mediatrix naturae". The individuals are in good health and can tolerate irradiations without discomfort or danger.

The prophylactic use of ultraviolet is of greatest importance for all diseases which are caused by a calcium-phosphorus deficiency, such as rickets, tetany of infants, and osteomalacia and eclampsia of pregnant women. The known facts that these diseases are prevalent in certain countries and in large cities, that they occur at those determined periods as infancy or pregnancy, and that they are hereditary to a certain extent, make the indication of prophylaxis as simple as the indication of therapeutics. The prophylactic treatment, particularly if given over a long period, does not need as large a dosage as the therapeutic irradiation; it never causes tetany as is the case in the therapeutic treatment of a pronounced rickets or osteomalacia. Here the calcium precipitation causes a temporary lowering of the blood calcium, which is responsible for tetany. As to dosage, Huldschinsky has shown that mild applications are sufficient for prophylaxis; on the other hand strong applications would not cause those untoward effects as are produced by an overdosage of viosterols, namely toxemia, diarrhea, hypercalcemia, etc. On one hand the application of ultraviolet is limited by the skin reaction which it causes; on the other hand, an ultraviolet over-exposure inactivates the ergosterol again and lowers its antirachitic property.

Aside from the prophylactic effects, ultraviolet exposure may result in other beneficial actions. These are not so well known as the ones already mentioned. The influence on gastric secretion may prevent malnutrition, the effect on the blood picture may be beneficial in anemia, the action on assimilation and elimination may be useful in obesity and certain disorders of cell metabolism.

The application of prophylactic ultraviolet depends on the sources of the energy at our disposal.

The sun transmits enough ultraviolet through the atmosphere from March to September. Excessive chilling in spring and excessive heat in summer should be avoided. Treatments should be as regular as weather and other circumstances permit, starting with 5 or 10 minutes and with practically no maximum time limit after the body has become accustomed to the light. Mild erythema is permitted but blistering should be avoided. Correct dosage is difficult on account of the immense variation of ultraviolet intensity with the season, time of the day, and atmospheric conditions. Infant's eyes must be covered and care is required to keep them shielded. Occasional sunbaths with heavy exposure of the unaccustomed skin are dangerous and should be avoided.

As artificial sources of ultraviolet light I mention the mercury arc and the carbon arc. They give excessive ultraviolet radiation and should be applied under close medical supervision.

Incandescent lamps which are said to emit ultraviolet are inefficient and cannot at present be used for prophylactic treatment.

Several manufacturers are developing lamps which combine the incandescent light with a mercury arc. Such lamps are very promising and represent a type which can be offered as a home model for prophylactic administration.

CURRENT NEWS AND COMMENT

Society of Physical Medicine

A well attended meeting of medical men and women representing every branch of the study and practice of physical methods of treatment was held last Friday, 14th November at 28, Portland Place, W.1., under the Chairmanship of Sir Leonard Hill, F.R.S. Many expressions of support were intimated from those unable to attend.

A statement was made by the Acting Hon. Secretary regarding his efforts to achieve unity among all physiotherapists in regard to the formation of a Society. After a very full discussion, in which all the speakers emphasized the desirability of attaining unity, the following resolution was proposed and passed *nem. con*:—

"That a Society of Physiotherapy be now constituted."

The title of the new society was discussed and it was decided to call it the Society of Physical Medicine.

A sub-committee consisting of the following was appointed for the purpose of drafting a constitution to be submitted to a later meeting, and dealing with other urgent matters:—Sir Leonard Hill, F.R.S. (Chairman), Drs. King Brown (Acting Hon. Secretary), A. Eidinow, G. Murray Levick, W. J. O'Donovan and W. Kerr Russell.

The spirit of the 1930 meeting was inspiring. As matters now stand it is the desire of all those legitimately interested in physical therapy to educate the overenthusiastic and progressive physician who endeavors to adopt physical therapy simply for its commercial value.

The old "standbys" were present: Walke, Kobak, Elsom, Tyler, Fouts, Titus, Wahrer, all of them were always on hand ready to do their bit. Unfortunately, Walke had to give up his place on the program, but, we are told, he more than took his time in discussing eight or ten papers. Walke just must have his say.

The special articles on the technic of therapeutic exercise and on massage which have appeared in recent issues of the *Journal of the American Medical Association* are indeed inspiring. They are written by men whose experience qualifies them to speak authoritatively. Those who have not collected these writings for future reference should do so now, as there are numerous occasions when information on these subjects is helpful. Therapeutic exercise, in particular, is one form of therapy which is not fully appreciated. In fact only a handful of physicians utilize it to the best advantage.

Within a few weeks the dates for the 1931 meeting of the American Congress of Physical Therapy will be announced. The tenth anniversary session will be held in Omaha, where the Congress took its inception. Plans are already under way for a banner convention. Omaha has promised a great deal and we are quite confident that we will not be disappointed.

The production of therapeutic fever continues to be a timely subject for discussion, especially since investigators have shown that diathermy is the method promising the most safety and satisfaction. J. Cash King of Memphis deserves much commendation for his researches in this field. The fact that pyretotherapy has assumed an important therapeutic status in certain chronic conditions like neurosyphilis adds much practical value to the work that has been done. It is not at all unreasonable that physical therapy should play a part in the modern management of diseases which heretofore were not favorably influenced by older methods.

An interesting article by Goodman on "Carbon Arc Lamps in Dermatology" appeared in the November issue of *Clinical Medicine and Surgery*. Goodman describes the technic and results of this therapy and names the dermatologic diseases which react favorably and unfavorably.

D. Laszlo and E. Weisel, writing in the *Klinische Wochenschrift,* No. 34, 1930, describe the technic of applying diathermy to the skull for hypertension. "Two electrodes 15x15 cm. are used, one being applied to the forehead and the other to the occiput. The strength of the current should be adapted to the individual, the greatest quantities of heat that are possible and that can be tolerated subjectively, being used. The sitting should usually last an hour. With all diseases accompanied by high tension the blood-pressure is lowered by 15 to 20 mm. Hg. within 10 minutes; the greatest decrease (by 30 to 40 mm. Hg.) occurs in 60 minutes. Although the blood-pressure rises again in a short time, the subjective improvement of the patient's condition is striking and lasting. With essential hypertonus, acute and chronic nephritis and secondary contracted kidney, actual cures have been achieved. Extremely beneficial results have also been seen in cases of meningeal irritation and headache of various etiology, especially headache of the nature of migraine and with climacteric troubles. No rise of temperature or change of the frequency of respiration and of the pulse has ever been observed during the diathermy treatment of the skull."

Toxic collapse has been combated successfully by hot plunge baths, writes Prof. Fr. Wirz (*Munchener medizinische Wochenschrift,* No. 29, 1930). "In eight cases of alarming collapse following the injection of Salvarsan where the usual medicaments failed, the author experienced the life-saving effect of a hot plunge-bath (so hot that it was only just possible to dip one's hand in).

"In all the cases concerned the pulse and respiration could hardly be discerned, the skin was greyish blue and cool. The patient's head had to be supported so as to keep it out of the water. In less than half a minute the skin of the whole body began to get vividly red, the pulse became palpable, a deep sigh then widened the patient's chest, followed by a vigorous expiration. The patient opened his eyes and made listless movements in order to escape from the unpleasantly hot bath. At the end of five minutes the patient was helped out of the bath, well rubbed down, wrapped in blankets and given another camphor injection. After a few hours it was possible to let him go home with someone accompanying him."

An Attractive Offer and an Appropriate Christmas Gift

When thinking of a suitable gift for your medical colleague, think of the ARCHIVES. A special offer of three subscriptions for ten dollars is made for the holiday month. Send in the names of three of your colleagues and ten dollars. We will acknowledge your gift to each one of them and send them the ARCHIVES for one full year. Remittance should be made to the American Congress of Physical Therapy and forwarded to Suite 716—30 North Michigan Avenue, Chicago, Illinois.

The *Radium Digest* for October offers the following precautions for the use of radium:

1. Don't use radium on a cachectic patient, nor a markedly anemic one.
2. Don't use radium in infected tissues.
3. Don't place radium nearer than 0.5 cm. to bone, nerve trunk, blood vessel of size, or in the thin wall of a hollow viscus.
4. Don't use radium on patients with white blood counts below 5000.
5. Don't use radium on patients suffering from generally debilitating diseases, viz., diabetes, nephritis, myocarditis, etc.
6. Don't use radium on patients who have had unknown amounts of radiation.
7. Don't fail to attach radium tubes to external parts of the body by means of a cord or wire.
8. Don't use radium excessively, thereby producing widespread necrosis.
9. Don't use radium on a patient with a fever.
10. Don't handle radium with the fingers.

Torbett, in the November issue of the *Texas State Journal of Medicine,* writes on Arthritis, and under the section on treatment stresses the correct uses of physical agents. Some of his statements are: "Massage is not used nearly so much as it should be in chronic convalescing cases." "Radiant heat and light applied after the bath for ten minutes, usually helps these cases; also diathermia may be of benefit, but frequently both make the acute infectious types worse if applied to the joint already inflamed instead of beyond it where heat and massage should be given in such cases."

A series of interesting cases of chronic ulceration is presented in the November issue of the *Indianapolis Medical Journal* by Dr. E. N. Kime of Indianapolis. In commenting on the cases, several of which are illustrated, Kime states: "Chronic ulceration is due to local ischemia or to inflammatory congestion. Successful treatment requires elimination of the causation factor, whether it be specific or nonspecific infection, or neoplasm. Physical measures, including x-ray, radium, electrosurgery, ultraviolet radiation, diathermy and galvanization are valuable adjuncts to regular medical and surgical regimen in these cases. Bacteriophage is likewise of value in selected cases."

Scholtz, discussing dermatologic therapeutics, (*California* and *Western Medicine*, November 1930) states: "Of all therapeutic resources available to dermatologists, physiotherapy is the most effective and powerful. It can be truly said that physiotherapy has revolutionized dermatologic therapeutics."

Protection of Skin Against Light

"What protects the skin against light?" is a question recently propounded by Prof. Mieser of Zurich (1). The usual answer is that the pigment is responsible and to a large extent this is true. But, as Miescher points out, this answer is not altogether satisfactory. It does not explain, for example, why a certain amount of protection can be acquired by those who either do not pigment under the sun's rays or only pigment imperfectly. Nor will the pigment theory explain the enormous differences in sensitivity between different parts of the body.

On studying the whole matter anew, the author found that the thickness of the corneal layer differed greatly in different parts of the body, the thickest being the palms of the hands and soles of the feet. Everyone knows the impossibility of producing a solar or ultraviolet light erythema on these parts, and a closer examination of the epidermis generally showed great variations in the thickness of the horny layer. On testing the skin with a mercury vapour lamp it was soon found that moderate exposure to light led to changes only in the higher cell layers of the *stratum Malpighi*, from which is derived the horny layer.

Further investigations clearly showed that there is a distinct relationship between the thickness of the horny layer and the sensitivity to light. Skin areas with a thin horny layer are very sensitive to light; others have moderate sensitivity; while on the palms of the hands to the soles of the feet (where the horny layer is extremely thick) it is practically impossible to obtain a light reaction.

Experiments with artificially produced melanin showed that the pigment is an excellent ultraviolet light filter. From its position in the skin, however, it only protects the cutis, whereas the horny layer is the protector of the epidermis. In the author's words, "the pigment layer is the sunshade of the cutis, just as the horny layer is the sunshade for the epidermis." The negro, whose skin is much thicker than that of a European, is therefore doubly protected — by deep colored pigment for the cutis and subcutaneous tissue, and a thick horny layer for the epidermis.

As the author points out, the functions of pigment are not confined only to its power of filtering off U-V rays. He suggests the possibility that it may also screen off visible and infra-red rays, and prevent excess of heat from reaching the body. We agree with him that this contention, which has been maintained by many authors, needs further investigation. (*B. J. of A. and P.*, Oct. 1930.)

"So much has been said about the success of radium in cancer," states Frank E. Simpson, in *Clinical Medicine and Surgery* (November, 1930) "that it may be of interest to turn about and speak of some of the failures and mistakes in its use". This is indeed interesting and clearly indicates the trend of thought even of the enthusiastic therapist who has confined himself to the special application of one particular remedy. Failures and mistakes are everyday experiences in medicine. It surely is suggestive of progress when we get to the point of taking inventory of the reasons why success is not always the end result.

Among the newer books on physical therapy is Dan McKenzie's "Diathermy". It is devoted to the specialty of laryngology and stresses particularly the surgical aspects of diathermy for benign and malignant tumors in and about the head.

THE STUDENT'S LIBRARY

THE INTERNATIONAL MEDICAL ANNUAL. A Year Book of Treatment and Practitioners' Index. By *Carey F. Coombs,* M.D., F.R.C.P., and *A. Rendle Short,* M.D., B.S., B.Sc., F.R.C.S., Editors and 33 Contributors. 598 pp. Price, $6.00. Forty-eighth year. 1930. New York. William Wood & Company.

This is as the contents indicate a review of the year's work in the treatment of disease. Each year a similar volume has appeared. The series should prove time-saving for the busy practitioner who needs to make a quick reference on some special problem in therapy. Illustrations, which are 54 in number, help to amplify the text material.

The editors in the introduction emphasize, "When we read in the lay press of 'startling discoveries,' new cures for cancer, and so forth, we are painfully impressed by the contrast between this attitude of mind and that habit of cautious skepticism which we have acquired in the course of our fight against disease. Indeed, we are apt to go too far in the direction of nihilism, and to assume that nothing can be both new and good. A survey of the volume now published proves that this attitude is not justified by the facts."

Practically every important specialty is covered and the original contributions include everything worth while in the medical literature of the past year. The conclusion in the introduction very aptly brings out that the year has been an active one and that there have been so many therapeutic advances that those who do not keep up with the times are doing a great disservice to their patients and themselves.

The same classification and plan as has been followed in previous editions are adhered to in this one. The large amount of material necessitates the use of a smaller point type than would be desirable for facility of easy reading, but this is justifiable under the circumstances. The references at the end of the original contributions assist the reader in further research of a subject, should more comprehensive perusal of the literature be necessary.

In this day when complete medical libraries are not always available and when busy practice prevents a search of the literature for special articles, and particularly their correct evaluation, a volume such as this is unusually acceptable.

Special attention is directed to the contribution on phototherapy which is indeed a comprehensive review of the subject so far as the recent advances are concerned. There are also reviews on the use of radium, diathermy and x-rays, and wherever these have been demonstrated to be of value therapeutically, due mention is made. Physical agents are given fair consideration and cognizance showing rather conclusively that physical therapy is now a recognized means of aiding in the care of human suffering and disease.

The reviewer has always looked forward with keen interest to the appearance of the Medical Annual. It is indeed an indispensable source of information for the physician and student who wishes to keep abreast of the times on the newer advances in medicine.

A PRACTICAL MEDICAL DICTIONARY of Words Used in Medicine with their Derivation and Pronounciation, including Dental, Veterinary, Chemical, Botanical, Electrical, Life Insurance and other Special Terms; Anatomical Tables of the Titles in General Use and those Sanctioned by the Basle Anatomical Convention; Pharmaceutical Preparations Official in the U. S. and British Pharmacopeias and Contained in the National Formulary, and Comprehensive Lists of Synonyms. By *Thomas Lathrop Stedman,* A.M., M.D., Editor of the "Twentieth Century Practice of Medicine" and of the "Reference Handbook of the Medical Sciences," formerly Editor of the "Medical Record." Eleventh revised edition, illustrated. New York, William Wood & Company. 1930. Price, $7.50.

In spite of the fact that a "preface is the last thing written and the least thing read," it is not in all cases the least thing interesting. One frequently discovers in this portion of a book the living personality of the author. In the pages referred to in this volume, we become acquainted with a pulsating, living being, radiating with scholarly a pulsating, living being, radiating scholarly charm. Two very interesting prefaces — the first and the most recent one—have been incorporated in this, the eleventh edition of what might be rightfully termed the most scholarly contribution to contemporary American Medicine. In these pages the reader becomes acquainted with a personality that is apparently as charming as it is scholarly. One reads with deep sympathy and appreciation the pioneering efforts and the intellectual foresight that entered into the construction of this book. Stedman confesses that "it is a matter of great satisfaction to be able to say that one of the primary objects of this work, namely the purification of medical orthography has, after two decades of patient effort, been attained." The author has had the satisfaction of seeing the major portion of his scholarly contentions adopted by the American Medical Association. As a lexicographer his influence on American medical writing has been profound.

The present edition has been thoroughly revised due to the fact "that a larger number—of new titles necessitated by the somewhat accellerated movement of medicine during the past two years—Definitions of words recently introduced into the physics of radiology have been included in anticipation of their adoption into medicine."

DISEASES OF THE SKIN. A text-book for Practitioners and Students. By *George Clinton Andrews,* A.B., M.D., Associate Professor of Dermatology, College of Physicians and Surgeons, Columbia University; Consulting Dermatologist and Syphilologist to Tarrytown Hospital; to St. John's Hospital, Yonkers; to Grassland's Hospital; and to the Broad Street Hospital, New York City. 1091 pages with 988 illustrations. Philadelphia and London. W. B. Saunders Company, 1930. Cloth, $12.00 net.

On occasions the conditions surrounding the creative efforts of an author are happily blended with his personal experiences and a work of unusual character is created. This volume is an example of an experience so propitious. It successfully fulfills the author's ambition; *e. g.,* to present to the medical profession a text that is up-to-date in its information and of service to the practitioner and medical student. Throughout these many pages one observes that a consistent effort has been made to classify and correlate the conservative principles of dermatology in a lucid and intelligent manner. The text is, therefore, extremely well balanced and includes a comprehensive discussion of the therapeutic measures and theories designated as relatively new and those that are now, by virtue of long established use, classified as orthodox or old. Following one of the best surveys of the principles of therapy in diseases of the skin, the author has devoted the space of five large chapters to a discussion of the essential values of physical measures. Each agent is separately dealt with and includes a conservative evaluation of x-ray therapy, super-soft x-rays (the so-called Grenz rays of Bucky), radium therapy, ultraviolet light and surgical diathermy. These chapters because they contain such a wealth of authoritative information may be easily placed in the catagory of miniature monographs on the subject. This particular section is an index of the value of the intelligent cooperation of selected authorities. Many dermatologists will particularly appreciate the timeliness of the discussion in regard to the effects of super-soft x-rays in selected skin lesions because of the newness of the subject and its recent exploitation as a spectacular agent. The biologic effect of these rays have been diligently studied by many foreign and American investigators, and the results of these experiences have been incorporated in this chapter. From this it is seen that these rays are not altogether as harmless as has been heretofore explained. Cases of atrophy and telangiectasia have been reported to follow its intensive use. It is pointed out by Andrews that "in spite of the general impression that the *w*-rays are harmless, there is no doubt that after intensive doses of them, roentgen sequelae may appear, even though the kilovoltage has never exceeded the arbitrary figure (8kv.) set up by Bucky as the safety limit. The clinical application of *w*-rays (super-soft x-rays) is attended by hazards similar to those entailed by the use of the beta rays from radium." In properly selected cases, good results have followed the intelligent application of these rays. It is, however, not certain at this period of our knowledge of radiation therapy that most of the positive effects of these rays may not be duplicated with proper administration of ultraviolet rays. Indeed, one arrives at such a conclusion from the reading of the author's scholarly chapter on ultraviolet rays. Certainly, the field of usefulness of this agent in dermatology is very large.

This volume is probably the first in its field to officially place the stamp of approval on the use of surgical diathermy in relation to accessible neoplasms. The author shows a gratifying orientation with this rather new procedure. The chapter discusses the possibilities and limitations of this agency in an intelligent and conservative manner. Generous space is devoted to the exposition of the various technics and includes discussions of the high frequency cutting current, electrodesiccation and electrocoagulation. The author has differentiated the indications for the use of each method and has evaluated the entire procedure in a lucid manner. The bibliography appended after each of the thirty-four chapters is very rich in its reference.

HANDBOOK OF ANATOMY. Being a Complete Compend of Anatomy Including the Anatomy of the Viscera, a Section on Surgical Anatomy, a chapter on Dental Anatomy, Numerous Tables, and Adopting the Newer Nomenclature, Commonly Called B. N. A. By *James K. Young,* M.D., F.A.C.S. Late Professor of Orthopedics, Graduate School of Medicine, University of Pennsylvania; Late Associate Professor of Orthopedic Surgery, University of Pennsylvania, etc., etc. Revised by *George W. Miller,* M. D., F.A.C.S. Associate in Anatomy, Jefferson Medical College; Surgeon to Montgomery Hospital, Norristown, Pennsylvania. Seventh Revised Edition. With 154 Engravings, Some in Colors. 460 pp. Philadelphia. F. A. Davis Company, Publishers. 1930.

One is impressed with the statement in the preface of the seventh edition that in recent years the half-hearted attempt of English-speaking authors to use the newer terminology has merely added the 5,000 words of the B. N. A. to the 50,000 anatomical terms already in use. "Many authors mention the new term but subsequently use the old one. In this revision, even at the sacrifice of brevity, the aim has been to consistently use the latinized form of the Basle Nomenclature in text, plates and index. Where both the new and the old terms are used the new is emphasized by its primary position."

There is always a need for a book of this kind and this revised addition should be accepted with favor especially by students and practitioners who are continually reviewing the subject of anatomy of the human body. The 154 illustrations add materially to the value of the volume for study purposes.

The arrangement of the contents is classical and permits of easy reference. In this arrangement is a section on surgical anatomy and a section on dental anatomy. While the material included in these chapters are found in all standard texts on anatomy the plan of segregating it simplifies the need of searching through the index when reference is to be made on some special subject. The chapter on dental anatomy should prove ideal for review purposes for the physician whose knowledge of this branch of anatomy has not always been sufficiently stressed.

INTERNATIONAL ABSTRACTS

Die Roentgenbehandlung Des Kindlichen Lymphatischen Rachenringes. (Roentgen Ray Treatment of Waldeyers Lymphatic Ring in Children). Herbert Schoenfeld and Gottfried Baumbach.

Strahlenther., 1930, Bd. 36, H. 3, (March) p. 472-476.

The authors believe that the indication for irradiating Waldeyer's lymphatic ring in children is particularly favorable in cases of tonsillar hypertrophy associated with frequently recurring infections of the pharynx. In 50 per cent of the cases the authors succeeded in removing recurrent anginas associated with tonsillar hyperplasia. This mode of treatment can compete with tonsillectomy and has the advantage over the latter by being a bloodless method. Injuries due to x-raying are avoidable by rational procedure. In their after-examinations (performed two to three years after treatment) the authors could not find anything that resembled a chronic lesion of the muceous membrane or a disturbance of the function of the oral or pharyngeal glands. Technique: hard rays, 180 KV., filtration by 0.5 mm Cu and 1 mm Al, tube 6 by 8, the size of the field was, however, reduced, according to the age of the child under treatment. On each side of the neck a cone of rays was focused so as to pass below the angle of the lower jaw and follow a direction somewhat from behind and beneath to above and in front. The efficient dose for Waldeyer's lymphatic ring resulting from both fields was from 30 to 50 per cent, at most 60 per cent of the skin erythema dose. The entire irradiation was as a rule administered in one sitting. The second irradiation was given no sooner than four weeks after the first one, and a third irradiation was, if necessary, added after another eight weeks. The authors have never given more than three irradiations.

Die Elektrotherapie Der Nervenkrankheiten. (Electrotherapy of Nervous Diseases). Ernst Tobias.

Ther. d. Gegenw., 1930, Jg. 71, S. 125-129 u. 170-174.

The methods of general electrotherapy comprise as follows:

(1). The general faradization of the body by the faradic roller or by a Baden rubber with fine pliable wire inset as devised by Kowarschik. It is especially adapted for conditions of exhaustion and weakness without hyperexcitability; a trial is however also indicated in the milder cases of general excitation with nervous cardiac and vascular difficulties. In lieu of the faradic current Bergonié's electrogymnastics with rhythmically interrupted currents can be applied.

(2). The faradic full bath, an exceedingly effective procedure which is much too rarely employed and can also be easily carried out at home if the adequate tub is at hand. It must not consist of conducting material; tubs of wood or clay are best suitable. The indifferent full bath with weak faradic current, from 10 to 12 minutes duration, with consecutive rest is as efficacious in functional neuroses as in organic nervous diseases, such as tabes, polyneuritis, poliomyelitis and flaccid paralysis.

(3). Galvanism in the form of the so-called galvanization in cases intolerant of faradic current. The cathode is placed on the stomach and the anode shifted to and fro and placed on the varying sites of the complaint.

(4). Franklin's head douche with its generally sedative effect.

(5). Autoconduction in the solenoid cage.

(6). General diathermy. The combination of general high frequency treatment in the solenoid with consecutive general diathermy has proved especially serviceable in nervous and arteriosclerotic hyperexcitability with and without increase of blood pressure.

The systemic treatment is then associated with local or symptomatic therapy. The latter (for example in headache) consists in the following procedure: (a) in galvanization of the head, the anode being placed on the forehead, the cathode on the nape of the neck—1 to 3 milliampères for from 3 to 5 minutes with rest of from 10 to 15 minutes' duration, or one electrode each on both temples.

(b) in galvanization of the sympathetic nerve with one electrode each on both sides of the neck.

(c) in Franklin's head douche of from 3 to 10 minutes duration.

(d) in the faradic hand, where the physician takes hold of one electrode, while he fastens the other to the body of the patient. After having switched on the current, the physician passes his hand armed with the electrode or his free hand over the head or nape of the neck of the patient.

In occupational neuroses, such as pianist and violinist spasms, electrotherapy is as a rule not efficacious until the affection has passed its acute stage and improvement has set in. In such cases the author prefers the stabile and unstabile galvanic anode, eventually followed by a weak galvanic two cell bath.

In the large field of vasomotor neuroses the author confines himself to the discussion of intermittent dysbasia. In this case the use of galvanic two cell baths is for the author the method of choice. In general he warns against diathermy. Diathermy proves only beneficial in case of severe pain and when applied subsequent to a galvanic two cell bath. In conclusion the author mentions the use of electrotherapy in Grave's disease. The method in use is chiefly galvanization, more rarely faradization of the thyroid gland.

Ueber Chronische Obstipation. (Chronic Constipation). H. Strauss.

Ztschr. f. ärztl. Fortbldg., 1930, Jg. 27, Nr. 9, (May) p. 277-284.

Chronic constipation can be influenced by nutritional and educational factors as well as by artificial means. Medicinal, psychotherapeutic and physical interferences belong to the latter. As regards to physical measures, regular motor function of the colonic musculature is known to presuppose bodily movement to some extent, since the retarding effect on the colonic function in bedridden patients is due to whichever kind of diseases the individual is subjected to. On the other hand the beneficial effect of rest on pronounced cases of spastic constipation, especially those associated with hyperexcitability, is also known. Thermal action can also influence the motor function of the large bowel. Thus, the ingestion of cold water or cold mineral waters on an empty stomach sometimes prove particularly beneficial as a kind of internal hydrotherapy. Good results can sometimes be also obtained by cold external hydrotherapeutic procedures in conditions of colonic relaxation. Treatment by enemata is indispensable for the management of proctostasis, i. e., for the constipation due to the insensibility of the rectum to the irritants proceeding from the scybala entering the rectum. The same is true of Hirschsprung's disease (megacolon). Oil enemata constitute the most gentle treatment; in irritative conditions 2 grams of anesthesin are to be added to 100 cubic centimeters of oil. Of the other physical measures massage, gymnastics and the electrical procedures are to be mentioned. As they are useful for the strengthening of the abdominal wall, they are first of all to be resorted to as a means of strengthening the muscles put into play at the defecation act. Considering, however, that massage and electrotherapy may also stimulate the colon, itself, towards contractions, massage and electrotherapy ought not to be regarded only as local irritants of the intestinal musculature, but also as pacemakers for the cure of the colon. One ought not, however, to overrate the successes obtained in this direction.

Technik-Und Anwendungsgebiet Der Sandbaeder. (Technique and Domain of Sand Baths). K. Lichtwitz.

Münch. Med. Woch., 1930, Jg. 77, Nr. 23 (June) p. 1000.

For sand baths one should use a selection of sand that is free as possible from lime and dust and with grains of approximately the same size. Sand baths are given at a temperature of from 45 to 52 degrees C. There occurs in the bath an increase in temperature of the patient (on an average as much as 38,1 degrees C.), a rise in the pulse rate (100-120) and a loss in body weight (in one bath as much as 3 kg.). No more than 3 baths should be given a week. A course comprises 20 baths. Sand baths are indicated for all rheumatic diseases and prove useful also in chronic nephritis (increase of the diuresis) as well as in the treatment of gynecologic exudates.

Betrachtungen Ueber Wandlungen In Der Bewertung Der Heliotherapie. (Considerations on the Changes the Appreciation of Heliotherapy Has Undergone). Kurt Klare.

Münch. Med. Woch., 1929, Jg. 76, H. 31 (Aug.) p. 1921.

With the progress in the knowledge of the several forms of tuberculosis and their course, the evaluation of heliotherapy in tuberculosis has been radically modified in the last decade. The notion that tubercular patients are not fit for the sun, has already become common knowledge of the physicians. In surgical tuberculosis, local and universal insolation has been reduced to a minimum (2 to 3 hours), which is in line with the biologic fundamental law of Arndt-Schultz, namely, that the vital activity of the cell is stimulated by feeble irritants, inhibited by strong ones and abolished by the strongest ones. Therefore in surgical tuberculosis the effect of a short irritation by sunlight is materially more favorable than that of a prolonged one. Patients in the stage of morbid hypersensitivity are not irradiated until the protective power has been enhanced under the climatic stimulus. Prolonged irradiation should only be resorted to in lupus and scrofuloderma, since it is possible here to influence the focus as such directly by the action of light. It is, of course, understood that the lungs are in a healthy state. The constitution, too, plays an important part in heliotherapy. Lymphatic-exudative children (principally fair-haired ones with a coloring of red) are very sensitive to light and frequently react by stubborn bronchitides, and hence should only be irradiated with great caution.

Postoperative Abfuehrmassnahmen. (Postoperative Cathartic Measures). V. Orator.

Fortschr. d. Ther., 1930, Jg. 6, H. 6, (March) p. 186-188.

In the treatment of postoperative intestinal paresis physical remedies can also be resorted to besides the use of medicinal and pharmacologic remedies. Here the heat plays an important part when obtained in the form of the electric par which should be applied with medium current strength. Moreover, hot-air baths can be used, either by Bier's boxes or by electric incandescent light baths, several times daily for about ten minutes. This procedure frequently requires the preliminary use of alcohol compresses to the patient's forehead and cardiac region and observation of the circulation. Enemata, too, are employed, the first one as a rule from 30 to 40 hours after the operation and then daily or oftener if necessary. Small glycerol enemata which cause an excellent osmotic irritation of the mucous membrane have proved particularly useful. Faradization of the abdomen, also, often exerts a very beneficial effect on the atonic state of the large intestine and asthenia of the bladder. The so-called electric enema acts in a similar manner. It is an enema of a sodium chloride solution connected with a direct current by a wire electrode inserted into the intestinal tube, while the second pole in the form of a broad plate electrode lies on the abdomen.

Erfahrungen Mit Roentgenbestrahlung Tabischer Reizzustaende. (Experiences with Roentgen Irradiation of Tabetic Irritative Conditions). H. Ahringsmann and W. Illig.

Nervenarzt, 1930, Jg. 3, H. 5 (May) p. 257-264

The authors treated 55 tabetics suffering from lancinating pains and gastric crises by irradiating the spinal cord. Several patients lost their pains or crises of many years' duration immediately after the irradiation and were completely free from such irritative phenomena during the years following the irradiation. The majority of the patients, however, showed improvement of their complaints only after repeated irradiation. The reaction was best in patients who had been taken ill not long ago. The authors were under the impression that patients with highly altered spinal fluid, especially with high pleocytosis, responded to irradiation more readily than did the others. They never saw any treatment other than x-raying yield successes so prompt and lasting. They irradiated in tabes the whole of the cord with three fields of 10 by 15 cm., a focal distance of 30 cm. and 50 per cent of skin erythema dose on the skin on three successive days. Between the several fields, the uppermost of which begins approximately at the hair boundary, an interspace of about 1 cm. is left in order to avoid untoward overlapping. Hard rays were used filtered by 0,5 Cu. plus 1 Al. The irradiation course can be repeated after eight weeks.

Die Behandlung Der Entzuendlichen Erkrankungen Des Peripheren Nervensystems. Max Schacherl.

Mitteilungen des Volksgesundheitsamtes im Bundesministerium für soziale Verwaltung, 1930, Nr. 14, (April) p. 112-115.

(Treatment of Inflammatory Diseases of the Peripheral Nervous System.)

Communications of the Board of Health of the Federal Ministry of Social Administration, 1930, Nr. 4, (April) p. 112-115.

While administration of vaccineurin nearly always produces complete recovery from acute neuritis, it is not always so in chronic neuritis. When three series of vaccineurin have been injected without success, this treatment should be given up and heating procedures be employed in the form of the vapor bath, hot air box, electric light baths, and mud packs. Benefit can also be drawn from cures in sulphurous waters, and finally from the action of radium in the form of the radium bath (from 6 to 8 millions Mache units), radium drinking cures (6 to 80 thousand Mache units), and the radium baths at Gastein and Joachimstal. Sulphurous injections in the form of Sufrogel sometimes prove very useful. Anodic galvanization exerts a favorable influence on localized chronic neuritis, whereat the anode is applied to the aching nerve in the form of a button electrode or at least as a small plate electrode (from 6 to 10 square cm), the cathode in the form of a large plate (from 150 to 200 sq. cm.) to the sternum or spinal column. The current is then slowly increased from 4, 6 to 10 milliampères for about 10 minutes.

Balneotherapie Der Haut-Und Geschlechtskrankheiten. (Balneotherapy of Cutaneous and Venereal Diseases). A. Buschke.

Ztschr. f. wissenschaftl. Bäderkunde, Jg. 4, H. 9 (June) p. 837-853, 1930.

Only definite types of eczema are adapted to pure climatotherapy, viz. those whose origin can be traced to the action of the so-called climatic allergens. Storm Van Leeuwen classifies among them animal and vegetable parasites, respectively their digestion products, the existence of which depends on climatic conditions such as temperature, humidity, and conditions of the soil. These irritative substances are present in the lowland and missing in high mountains, hence high free places (above 1500 meters) are recommendable. In the other types of eczema water, air and insolation should be considered as noxious irritants in the acute stages. In chronic eczema often due to metabolic disturbances, drinking cures are indicated, the alkaline-saline waters (Karlsbad, Marienbad) being here recommendable. In these forms of eczema external treatment plays moreover an essential part. Carbonic acid baths act as mild irritants of the skin, while the action of the alkaline-muriatic and alkaline-saline springs is stronger. The strongest irritative action is inherent in sodium-chloride and brine springs, which should therefore be prescribed with particular caution. They are apt for the treatment of torpid eczemas in delicate tuberculosis patients as well as of eczemas of the female genitalia. Sea baths are of recognized benefit in chronic eczema. The treatment of neuritic affections of the skin (pruritus, prurigo) tends to an increase of diuresis by drinking cures and thereby the elimination of slags whose increased reduction and storage in the skin is a main cause, especially of senile pruritus. The external use of mineral baths endowed with slight irritation of the skin (carbonic acid or mild sulphuretted baths) relieves itching as do air and sun baths of short duration. It would also seem that the stimulation of the metabolism of the skin itself plays a röle.

In case of stubborn furunculosis, sulphuretted baths prove beneficial by acting chiefly by way of local disinfection, and probably also by absorption. Drinking cures have also been found to be beneficial due to the inherent virtues of the internal use of sulphur. Occasionally, also, arsenic-containing waters yield good results.

As regards syphilis, the importance of the skin as a protective organ and for antibody formation is now well known, and has of late seen a greater appreciation for the non-specific measures in the treatment of syphilis. Balneotherapy should especially be reserved for cases which prove resistent to or intolerant of specific treatment, or are associated with severe psychical depressions. Phenomena of severe tertiarism react particularly well to balneotherapeutic and climatic irritations. The promotion of the elimination of medicaments especially mercury is also found to be helpful therein. Sulphuretted baths are most beneficial here. In case of late forms of congenital or acquired syphilis, iodine containing springs should be resorted to.

Die Heliotherapie Am Meere. (Heliotherapy at the Seaside). Giulio Ceresole.

Strahlenther, Bd. 36, H. 4 (May) p. 641-659, 1930.

Sea climate permits of a more convenient method of grading the intensity of sun cure. As diffuse light is very rich in the short rays, available at the sea-side, heliotherapy can be administered without it being necessary to have the patient insolated directly. In the shade of a parasol, attenuated heliotherapy can be applied on the beach in such a manner as to get the body exposed only to diffuse and reflected light. One must, however, bear in mind that the light reflected from the sea is richer in ultraviolet and poorer in infrared rays, while in the light reflected from a sandy beach there is a predominance of rays of long wavelength. The bare body, when exposed to diffuse light under a parasol, undergoes an attenuated form of heliotherapy. When, however, the body is exposed to diffuse light as reflected from the sea level, there results a milder sun bath rich in chemical rays and poor in red and infrared ones.

When one directly exposes oneself naked to the sun by lying or walking in the sand a highly efficient "warm" sun bath is taken due to the reflection from the sand surface of the rich infrared calorific rays. When on the contrary one exposes oneself to direct insolation in a boat at sea, the resulting sun bath is also greatly effcient but characterized by the prevalence of ultraviolet radiation over the red and infrared calorific rays. Thus suitable gradation of sun baths in quantitative and qualitative respects are made possible by the sea. With adequate technic heliotherapy should always induce the sensation of euphoria; its absence implies of course that something is wrong and the cause must be found. With sick people Rollier's scheme is followed, with healthy people irradiation should first be given to the whole of one side of the body and then be followed by irradiations of the contralateral side next day (foreside, hind part, right and left sides); the duration of the exposures is lengthened until pigmentation occurs. Then irradiations of the whole body should be administered up to at most three hours daily, spread over forenoon and afternoon.

Operation Fortgeschrittener Boesartiger Geschwuelste Durch Elektrischen Schnitt Und Durch Elektrische Verkochung. (Operation of Advanced Malignant Tumors by Electrocutting and Electrocoagulation). Hans von Seemen.

Münch. med. Woch., 1930, Jg. 77, Nr. 16, (April) p. 675-677.

This procedure was applied in case of tumors of the oral cavity, tonsils and tongue. They are destroyed as radically as possible by electrocoagulation. When the tumor is very extensive, tracheotomy should be done previously in order to avoid aspiration. In carcinomata of the upper jaw, the anterior wall of the upper jaw is exposed by an incision made by the electric knife and chiselled off and the tumor coagulated under guidance of the eye; then the ethmoid cells, and, if necessary, the orbit and frontal sinus are cleared out. This procedure avoids aspiration to a great extent. Thus the unilateral resection of a lower jaw for sarcoma could be carried out without any ligature. Cancer of the breast is encircled by an electric incision and removed together with the breast muscles after pre-existing ulcerations have been sterilized by coagulation. Clearing out of the glands is done by the knife or by using the finest wire for division of lmphatic cords. The carcinomatous prostate can be coagulated under the guidance of the eye after opening of the bladder. In rectal carcinoma an artificial anus is first provided and later the tumor is exposed and electrocoagulated by layers, the exposition being brought about by dorsally dividing all the tissues in the median line inclusive of the posterior intestinal wall by the electric knife and adding, if necessary, the usual chiselling off of the coccyx and inferior part of the sacrum.

The use of the diathermy current for incision and electrocoagulation affords the opportunity of enlarging the indications for surgical interference in a large number of inoperable, recurrent and unsuccessfully irradiated tumors. The author points out that a drawback of the procedure is the necessity of avoiding aspiration anesthesia by ether. The kinds of narcosis to be applied are local anesthesia, for major protracted operations avertin anesthesia, and in other cases superficial chloroform or laughing gas anesthesia.

Therapie Der Polyarthritis In Der Subakuten Phase. (The Therapy of Polyarthritis in the Subacute Stage). L. Schmidt and Eduard Weisz.

Medizin. Welt, 1930, Jg. 4, Nr. 20 (May) p. 707.

Once the acute febrile stage has passed, the application of cold should be discontinued as promptly as possible. Long-standing ice poultices handicap the circulation of the blood and lymph, nay, even paralyze the vasomotors and muscles. The authors recommend the use of sheet baths with hot sulphurous water for subacute swellings. One is often surprised at seeing edemas and hypersensitivities disappear by this treatment. The use of sulphuretted baths requires great circumspection. One begins with a temperature of 34-35 degrees C., whihc is increased up to 40 to 43 degrees C. when there is no heavy reaction. In case of local mud treatment materially higher degrees of heat can be applied, up to 48 degrees C. (38to 39 degrees R). Massages and Swedish movements should only be applied to a very small extent in the first stage of treatment, later on they can be applied energetically.

DEC 16 1930

Archives of PHYSICAL THERAPY, X-RAY, RADIUM

with

INTERNATIONAL ABSTRACT

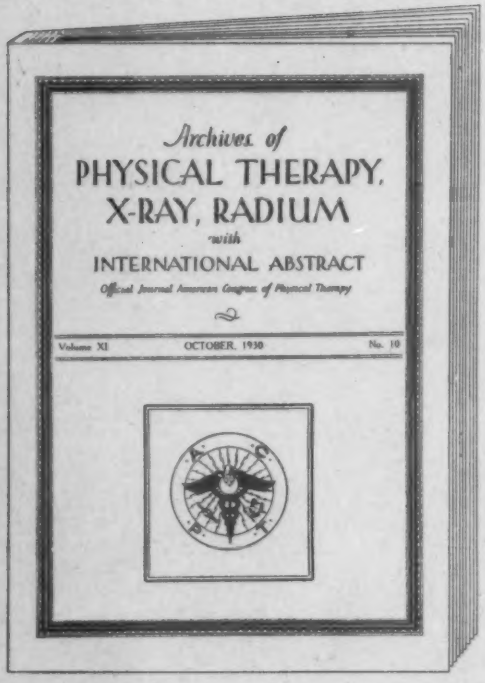
Official Journal American Congress of Physical Therapy

UNIVERSITY OF NEBRASKA
LIBRARY
COLLEGE OF MEDICINE

Volume XI DECEMBER, 1930 No. 12

A GOOD XMAS GIFT

IS A SUBSCRIPTION TO THE



Archives of Physical Therapy, X-Ray, Radium

A Special Offer for the Holiday Month Only

3 SUBSCRIPTIONS FOR $10

Your colleagues will enjoy reading the ARCHIVES each month. Start them by giving them for Christmas ONE YEAR'S SUBSCRIPTION TO THE LEADING PUBLICATION IN THE FIELD OF PHYSICAL THERAPY.

Send in the names and addresses of three of your colleagues and $10. We will acknowledge your gift to each one of them and will send them the ARCHIVES for one year.

THIS OFFER FOR THE MONTH OF DECEMBER ONLY!

Mail names and check, or money order to

AMERICAN CONGRESS of PHYSICAL THERAPY

716 — 30 North Michigan Avenue
CHICAGO, ILLINOIS

Over One Hundred Important Articles On Physical Therapy Will Be Published In The ARCHIVES During 1931

A Great Store in a Great City

THE FAIR

State, Adams and Dearborn Streets
Oak Park—Lake at Marion St. Milwaukee Ave. at Wood St.

SURGICAL DEPT.
THE FAIR, STATE ST.,
SEVENTH FLOOR

CHICAGO'S FASTEST GROWING SURGICAL DEPARTMENT

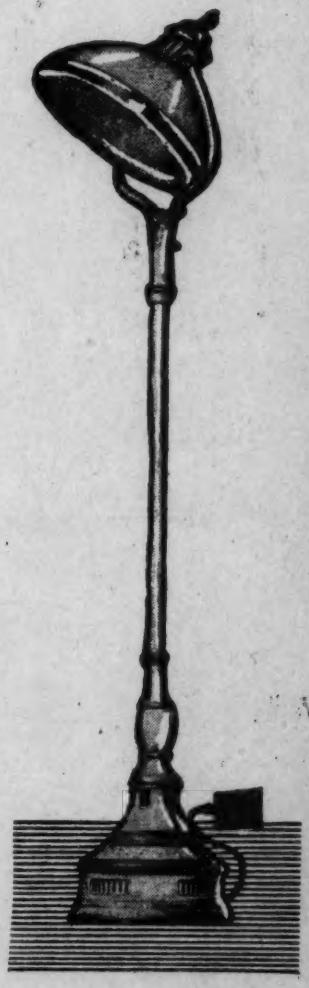
A SALE . . .

Westinghouse Electric Sun Lamps

$49.50

Regularly $69.50

Safe—Simple to Operate—Low Priced



NO WONDER the hardy desert tribes worshipped the sun! Sunlight meant health to them, even as it does today . . . yet how much more safe, simple and enjoyable is this modern method of acquiring the vitalizing sun rays! Beautiful, Westinghouse adds to the attractiveness of any room!

The type S-1 bulb is recognized as a safe source of ultra-violet for home use. The bulb can be replaced when burned out. Physicians who appreciate value will want one or more for the office, and recommend them to patients for use under their direction.

THE FAIR, Surgical Department,
CHICAGO, ILLINOIS.

Please send me one Westinghouse Sunlamp, as advertised. F. O. B. Chicago, Ill.

Remittance enclosed..... Charge to my account.....

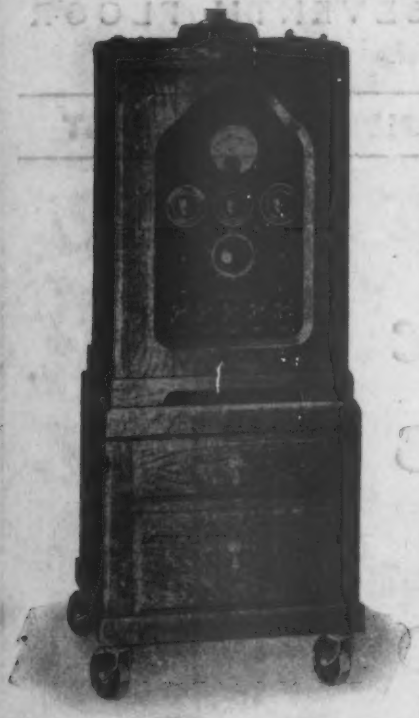
Name..... City.....

Address..... State.....

Use This Convenient Order Blank

THE FAIR — SURGICAL DEPT., SEVENTH FLOOR, STATE STREET STORE

Amazing NEW *Fischer Unit*



The New FISCHER Medical and Surgical Diathermy and Tissue Cutting Apparatus—MODEL CDC.

ADVANTAGES

1. Offers every usable high frequency current.
2. Permits gradual unbroken shock-proof increase in current.
3. Has more than ample power for every need.
4. Cutting and coagulation currents may be used simultaneously.
5. Absolute safety is assured.

LOW IN PRICE EASY TERMS

The well-known Fischer guarantee and reputation is back of this new Medical and Surgical Diathermy and Tissue Cutting Unit. It contains many new and exclusive features. Write for the facts today. No obligation.

MAIL THIS COUPON

COMBINING IN ONE APPARATUS

1. Medical Diathermy

Offers increase in milliamperage from zero to upwards of 6000 m. a. positively without break or shock. No changing of primary controls as on other types of machines is necessary. You have always the same high quality, perfectly resonant discharge of Diathermy current.

2. Surgical Diathermy

The Surgical Diathermy (electrocoagulation) current is also controlled with exceptional fineness. Produced from separate windings, providing the low voltage and high amperage discharge so necessary for true tissue coagulation.

3. Tissue Cutting

Offers three types: (a) Clean cut where wound is to be sutured; (b) dehydration of side walls to stop oozing; (c) for malignancies both dehydration and coagulation. Cutting and coagulation currents may be used simultaneously.

WITHOUT reservation, it can be said that this new Fischer MEDICAL and SURGICAL DIATHERMY and TISSUE CUTTING APPARATUS is the most remarkable and most advanced diathermy unit ever offered to progressive physicians. It is the outfit leading physicians have wanted. Every high frequency current is available — both damped and undamped wave types. It is the outgrowth of long research in university and hospital clinics and in the Fischer laboratory. Nothing like it has ever before been available.

Endorsed by Users in the Most Outspoken Terms

After exhaustive laboratory and clinical tests, special units have now been in use by outstanding physicians and hospitals for many months. The highest, unqualified praise has come from every user. This new unit for its special field is the masterpiece of Fischer creation. For power, fine control, safety, durability and convenience in use it is recommended to every forward-looking physician.

Write for full particulars. No obligation. Simply clip and mail attached coupon.

(Arch of P. T. 12-30)

H. G. FISCHER & CO., Inc.,
2323-2337 Wabansia Ave., CHICAGO, ILL.

I am interested in your new Medical and Surgical Diathermy and Tissue Cutting Apparatus. Please send full information. No obligation.

Name .....

Street .....

City..... State.....

Die Heliotherapie Am Meere. (Heliotherapy at the Seaside). Giulio Ceresole.

Strahlenther, Bd. 36, H. 4 (May) p. 641-659, 1930.

Sea climate permits of a more convenient method of grading the intensity of sun cure. As diffuse light is very rich in the short rays, available at the sea-side, heliotherapy can be administered without it being necessary to have the patient insolated directly. In the shade of a parasol, attenuated heliotherapy can be applied on the beach in such a manner as to get the body exposed only to diffuse and reflected light. One must, however, bear in mind that the light reflected from the sea is richer in ultraviolet and poorer in infrared rays, while in the light reflected from a sandy beach there is a predominance of rays of long wavelength. The bare body, when exposed to diffuse light under a parasol, undergoes an attenuated form of heliotherapy. When, however, the body is exposed to diffuse light as reflected from the sea level, there results a milder sun bath rich in chemical rays and poor in red and infrared ones.

When one directly exposes oneself naked to the sun by lying or walking in the sand a highly efficient "warm" sun bath is taken due to the reflection from the sand surface of the rich infrared calorific rays. When on the contrary one exposes oneself to direct insolation in a boat at sea, the resulting sun bath is also greatly effcient but characterized by the prevalence of ultraviolet radiation over the red and infrared calorific rays. Thus suitable gradation of sun baths in quantitative and qualitative respects are made possible by the sea. With adequate technic heliotherapy should always induce the sensation of euphoria; its absence implies of course that something is wrong and the cause must be found. With sick people Rollier's scheme is followed, with healthy people irradiation should first be given to the whole of one side of the body and then be followed by irradiations of the contralateral side next day (foreside, hind part, right and left sides); the duration of the exposures is lengthened until pigmentation occurs. Then irradiations of the whole body should be administered up to at most three hours daily, spread over forenoon and afternoon.

Operation Fortgeschrittener Boesartiger Geschwuelste Durch Elektrischen Schnitt Und Durch Elektrische Verkochung. (Operation of Advanced Malignant Tumors by Electrocutting and Electrocoagulation). Hans von Seemen.

Münch. med. Woch., 1930, Jg. 77, Nr. 16, (April) p. 675-677.

This procedure was applied in case of tumors of the oral cavity, tonsils and tongue. They are destroyed as radically as possible by electrocoagulation. When the tumor is very extensive, tracheotomy should be done previously in order to avoid aspiration. In carcinomata of the upper jaw, the anterior wall of the upper jaw is exposed by an incision made by the electric knife and chiselled off and the tumor coagulated under guidance of the eye; then the ethmoid cells, and, if necessary, the orbit and frontal sinus are cleared out. This procedure avoids aspiration to a great extent. Thus the unilateral resection of a lower jaw for sarcoma could be carried out without any ligature. Cancer of the breast is encircled by an electric incision and removed together with the breast muscles after preexisting ulcerations have been sterilized by coagulation. Clearing out of the glands is done by the knife or by using the finest wire for division of lmphatic cords. The carcinomatous prostate can be coagulated under the guidance of the eye after opening of the bladder. In rectal carcinoma an artificial anus is first provided and later the tumor is exposed and electrocoagulated by layers, the exposition being brought about by dorsally dividing all the tissues in the median line inclusive of the posterior intestinal wall by the electric knife and adding, if necessary, the usual chiselling off of the coccyx and inferior part of the sacrum.

The use of the diathermy current for incision and electrocoagulation affords the opportunity of enlarging the indications for surgical interference in a large number of inoperable, recurrent and unsuccessfully irradiated tumors. The author points out that a drawback of the procedure is the necessity of avoiding aspiration anesthesia by ether. The kinds of narcosis to be applied are local anesthesia, for major protracted operations avertin anesthesia, and in other cases superficial chloroform or laughing gas anesthesia.

Therapie Der Polyarthritis In Der Subakuten Phase. (The Therapy of Polyarthritis in the Subacute Stage). L. Schmidt and Eduard Weisz.

Medizin. Welt, 1930, Jg. 4, Nr. 20 (May) p. 707.

Once the acute febrile stage has passed, the application of cold should be discontinued as promptly as possible. Long-standing ice poultices handicap the circulation of the blood and lymph, nay, even paralyze the vasomotors and muscles. The authors recommend the use of sheet baths with hot sulphurous water for subacute swellings. One is often surprised at seeing edemas and hypersensitivities disappear by this treatment. The use of sulphuretted baths requires great circumspection. One begins with a temperature of 34-35 degrees C., whihc is increased up to 40 to 43 degrees C. when there is no heavy reaction. In case of local mud treatment materially higher degrees of heat can be applied, up to 48 degrees C. (38to 39 degrees R). Massages and Swedish movements should only be applied to a very small extent in the first stage of treatment, later on they can be applied energetically.

ARCHIVES *of* PHYSICAL THERAPY, X-RAY, RADIUM

with

International Abstract

OFFICIAL JOURNAL AMERICAN CONGRESS OF PHYSICAL THERAPY

EDITED BY

DISRAELI KOBAK, M.D.

Volume XI — January-December, 1930, Inclusive

OFFICERS OF THE AMERICAN CONGRESS OF PHYSICAL THERAPY

EXECUTIVE AND EDITORIAL OFFICES,
30 N. MICHIGAN AVE., CHICAGO

BOARD OF GOVERNORS

President — Roy W. Fouts.....Omaha
President-Elect — F. H. Ewerhardt.....St. Louis
First Vice-President — Gustav Kolischer.....Chicago
Second Vice-President — L. A. Tarbell.....New Haven, Conn.
Third Vice-President — J. S. Hibben.....Pasadena, Cal.
Fourth Vice-President — F. H. Morse.....Boston
Secretary — F. L. Wahrer.....Marshalltown, Ia.
Treasurer — John S. Coulter.....Chicago
Editor — Disraeli Kobak.....Chicago
Executive Secretary — Marion G. Smith.....Chicago

PUBLICATION COMMITTEE

DISRAELI KOBAK, Chairman
A. R. HOLLENDER — A. F. TYLER
J. C. ELSOM — HAROLD SWANBERG

This is an index to all the original articles, abstracts, clinics, editorials and book reviews in the *Archives* for the year 1930.

A

ACTINIC RAY: See also ultraviolet, sunlight.
In gynecological and obstetrical practice, 228
ACTINOMYCOSIS: [Epstein and Schoenholz] 35—ab
ALOPECIA AREATA: Treatment of, [Narducci] 505—ab
apparatus for, [Bettman] 250—ab
ANAEMISATION: And vessel massage, a new apparatus for, [Bettman] 250—ab
ANESTHESIA: New and efficient rectal, [Spiegel] 142—ab
Tribromethylalcohol [Avertin] in electrosurgery of head and neck, 120
ARTHRITIS: See also rheumatism
Chronic classification to treatment, 199
Deformans, method of treatment for [Haas] 377—ab
ASTHMA: Physical therapy, adjunct in, 619
Radiotherapy of bronchial [Huet and Sobel] 568—ab
Ultraviolet rays in [Saidman] 636—ab
ATRESIA: Congenital esophageal [Vogt] 41—ab
ATROPHIC RHINITIS: Physical therapy, adjunct in, 225
AVERTIN: Anesthesia in electrosurgery of the head and neck, 120

B

BALNEOTHERAPY: In osteomyelitis 131
Of cutaneous and venereal diseases [Buschke] 695—ab
Theoretic bases of [Harpuder] 503—ab
BATH: As artificial climate [Fox] 506—ab
Bubble and paraffin, Value of [Furstenberg] 380—ab
Effect of thermal on endocrines, metabolism, respiration [Grunow] 504—ab
Gymnacolon intestinal [Gottheil] 378—ab
Hauffe's partial [Genkin and Jassman] 508—ab
Relation of anaphylactic and anaphylactoid conditions to reactive processes of thermal, [Grunow] 441—ab
SAND: technique [Lichtwitz] 694—ab
BATHING: and drinking cures by brine springs [Vogt] 251—ab
BISMUTH: Colloidal, in advanced cancer [O'Brein and Schreiner] 142—ab
BLADDER: Electrocoagulation of tumors of, [Kolishcher] 46—ab
BLOOD: Influence of sun baths on sugar curve, at high altitudes [Basel] 140—ab

BOOK REVIEWS

A

ALVAREZ, WALTER C.: The Mechanics of the Digestive Tract. An Introduction to Gastroenterology, 374
ANDREWS, GEORGE CLINTON: Diseases of the Skin, 692

B

BALLENGER, WILLIAM LINCOLN: Diseases of the Nose, Throat and Ear. Medical and Surgical, 437
BECKMAN, HARRY: Treatment in General Practice, 374
BUCKY, G.: Anleitung zur Diathermiebehandlung, 500

C

CABOT, RICHARD: Physical Diagnosis, 565
CHERRY, THOMAS H.: Surgical and Medical Gynecological Technique, 30
COOMBS, CAREY F., and A. RENDLE SHORT, International Medical Annual, 691

F

FITZWILLIAMS, C. L.: Radium and Cancer, 437

H

HALL, PERCY: Ultraviolet Rays in the Treatment and Cure of Disease, 501
HARRIS and FINESILVER: Normal Facts in Diagnosis, 246

J

JACKSON, CHEVALIER, and COATES, GEORGE MORRISON: The Nose, Throat and Ear and their Diseases, 311

K

KISCH, EUGENE: Medizin Gymnastik und Pedagogik im Kampfe die Tuberculose, 500
KOWARSCHIK, JOSEF: Electrotherapie, Ein Lehrbuch, 438

L

LARKIN, A. JAMES: Radium in General Practice, 374
LIVERMORE, G. R.: Gonorrhea and Kindred Affections. Gonorrhea in the Male; Chancroid and Verruca Acumenata; and Gonorrhea in the Female and the Infectious Granulomata, A. SCHUMANN, 246

M

MANN, LUDWIG, Editor: Newer advances in the Study of Medical Electricity with Information on X-Ray, Electrophysik, Elektrophysiologie, Elektropathologie, Electrodiagnostik, Electrotherapie, 247

O

OSBORNE, OLIVER T.: What Everyone Ought to Know, 30

R

RHEUMAPROBLEME: [Collected Addresses on the Investigation of Rheumatism]. Held at the Institute of Landesbad in the Rhine—Province of Aachen, 565

S

SAIDMAN, JEAN: Les Rayons Ultraviolets En Therapeutiques, 310
La Sensitometrie Cutanee, Introduction A L'Actinotherapie Rationelle, 311

SANSUM, WM. D., GRAY, P. A., and BOWDEN, RUTH: The Treatment of Diabetes Mellitus, 375
SPIEGLER, GOTTFRIED and FERNAU, ALBERT: Tashenbuch der Medizinichen Rőntgen u-Radium Technik, 374
STEDMAN, THOMAS LATHROP: A Practical Medical Dictionary, 691
STEINDLER, ARTHUR: Diseases and Deformities of the Spine and Thorax, 566

T

TURRELL, W. J.: Principles of Electrotherapy and their Practical Application, 138

W

WADDINGTON, J. E. G.: Practical Index to Electro and Photo Therapy Including an Index of Diseases with Descriptive Techniques, 566
WELLS, WALTER A.: The Common Head Cold and its Complications, 246
WILLUS, FREDERICK A.: Clinical Electrocardiograms, 438

Y

YOUNG, JAMES K.: Handbook of Anatomy, 692

B

BRAIN: Treatment of, and Cord, [Kraus] 509—ab
BRINE SPRINGS: Action of bathing and drinking cures by [Vogt] 251—ab
BRONCHIAL OBSTRUCTION: [Coryllos and Birnbaum] 41—ab
BURNS: Ionized silver in treatment of [Shillits] 249—ab
Ultraviolet treatment for, 331

C

CALCIUM: Pregnancy and Light [Guthmann and Schol] 252—ab
CALCULI: Ultraviolet rays, adjuvant in treatment of biliary, [Lorand] 252—ab
CANCER: See also tumors, neoplasms
Adenocarcinoma of uterus [Meigs] 35
Breast, 32—ab
Breast, improvements in operative results in, by after-radiation [Hintze] 380—ab
Cautery surgery in uterine, 36
Cervical, Basic cause and nature of [Bailey] 196
Cervical complicating pregnancy, [Kaplan] 573
Cures, 485
Effect of radium on cells of, 538
Esophagus and Stomach [Hickey] 31—ab
High frequency currents in treatment of, 347
Irradiation of [Lazarus] 315—ab
Lead treatment [Ullman] 37—ab
Mammary gland [Penzio] 251—ab
Mouth [Campbell and Georgici] 140—ab
Mouth, in and about, [Blair, Brown and Womack] 196—ab
Multiple X-ray of Psoriasis, following, 209
Penal, electrocoagulation for [Corbus] 253—ab
Primary of Breast, radium for [Keynes] 314—ab
Prostatic, high voltage x-ray in [Smith] 382—ab
Radiosensitive epidermoid [Ewing] 36—ab
Radium and surgery in face, 536
Skin [Williams] 37—ab
Treatment of Mammae at Radium Hemmet [Westermark] 635
Ureteral, primary, [D'Aunoy and Zoeller] 140—ab
Uterine cervical, radium vs. surgery, 519
CARBON: Arc lamps [Dorcas] 377—ab
CARBONIC ACID: Baths in circulatory disturbances, [Groedel] 378—ab
CARBUNCLES: [Harris] 38—ab
CARDIOSPASM: In newborn infant [Birnberg] 390—ab
CARDIOVASCULAR: Electric treatment in disease [Schwig] 634—ab
CASTS: Simple means of removing Plaster Paris, [Emde and Andreas] 254—ab
CHOLECYSTOGRAPHY: [Wilson] 139—ab
CLIMATE: Recreation effects in children by [Heinz] 640—ab
CLIMATIC: Cure in children [Dmitreff, Dernoff and Vasileff] 639—ab
CLINICS: Light at Tuberculosis dispensaries [Cox] 139—ab
COLON: The, a factor in disease, 668
Chronic [Strauss] 694—ab
CONSTIPATION: Diagnosis and treatment of [Osgood] 34—ab
Therapy of habitual [Glaessner] 507—ab
CORNEA: Treatment by ultraviolet [Gasteiger] 255—ab
COSMETIC: Actual status of dermatologic [Hoffman] 503—ab
CURRENTS: See also X-rays, high frequency, galvanism
Low tension, Indications and Technic, 237

D

DEATH: Physical nature of, 541
DIATHERMY: Apparatus, How to use it, 604
Coagulation in cervicitis, [Ende] 32—ab
Combined apparatus and treatment table, 674
Device for protection against burns [Kowarschik] 503—ab
Effects of [Spiegel] 441—ab
Efficiency of pads or plates as electrodes for, [Simon] 43—ab
Efficiency conditions in circuits [Clark] 42—ab
Electrodes for treatment of stenoses of rectum and esophagus [Dinkin] 379—ab
Experience in one thousand cases [von Bueben] 503—ab
Facts concerning and its current, 395
In gynecology, [Kolischer] 570—ab
Medical, in treatment of hemorrhoids, 665
On operations of [Mayer] 569—ab
Pelvic, 654
Spinal, 571—ab
Statistical study of uses of, with actinic rays in gynecological and obstetrical practice, 228
Surgical, in neoplasms about head, 205
Surgical of synechiae [Ludecke] 312—ab

Tonsillectomy by, [Collins] 639
Treatment of brain and cord [Kraus] 509—ab
Treatment of gynecologic inflammation [Von Amstel] 317—ab
Treatment of pneumonia, 150, 155
Treatment seminal vesiculitis, 162
Treatment of testicle and epididymis [Kowarschik] 574—ab
Trypflavin injections, combined with in gonorrhoeic complications [Philipsen] 250—ab
DIVERTICULUM: Esophageal [Goodman] 37—ab
Of upper alimentary tract [Paterson] 43—ab
DOSAGE: Factors in determination of [Martin] 32—ab

E

EDITORIALS

B

Biologic significance of near and far ultraviolet rays, 360
Books and writings and physical therapeutics, 616

C

Change of name, 26
Commercializing physiotherapy, 135

D

Dextoxification effects by ultraviolet rays, 361

E

Electrosurgical extirpation of tonsils and recurrent lymphoid tissue after tonsillectomy, 613
Electrosurgery in gynecology, 135
Examination for technicians, 364

F

Fifth International Congress of Physiotherapy, 135

G

Growing of cancer cells, 617

I

Ikhnaton, Apostle of Sun Worship, 300

K

Knighthood Conferred on Professor Leonard Hill, 430

L

Laryngeal tuberculosis, with special reference to ultraviolet therapy, 681.
Last call for annual session, 427

M

Modern treatment of corneal ulcers, 679
Motion Pictures as an Aid in Medical Instruction, 136

N

New issue for old, 428
Ninth Annual Session, 551

P

Physical therapy department and the hospital, 555
Physical therapy in arthritis, 232
Physical therapy week in Los Angeles, 193
Physical therapy in angina pectoris, 615
Post graduate week, 134
Post graduate course in radiology, 193
Present status of cancer problem, 552
Presidential address, 24, 487

R

Radiation therapy of tonsils, 192
Radium treatment of cancer of uterus, 556
Reduction of the Inferior Turbinate, 364
Research Council of American Congress of Physical Therapy, 556

S

Spirit of research, 678
St. Louis meeting, 297

T

Therapeutic fever produced by diathermy, 234
Therapeutics of heat and cold, 301
Tonsil problem again, 430

U

Ultraviolet in tuberculosis, 298
Unit of intensity for ultraviolet light, 235
Upper respiratory infections, 233

X

X-ray film storage, 491

EDUCATION: And training in physical therapy, 27
Rational teaching methods in physical therapy, 460
Teaching physical therapy, 455
ELECTRODES: Endothermic, 18
ELECTROSURGERY: See also electrocoagulation, diathermy in neoplasms about head, 205
Nonvolatile anesthesia in, 343
Of tonsils, 1
ELECTROSURGICAL: Destruction of recurrent lymphoid tissue after tonsillectomy, 600
Knife in major operations, 559
ELECTROTHERAPY: See also Physical therapy
Applied to otolaryngology, 110
For digestive tube and appendages [Hollenfeltz] 444—ab
Of nervous diseases [Tobias] 693—ab
Rhythmical currents in [Oppenheim] 639—ab
EMPHYSEMA: Physical treatment of [Kirchberg] 316—ab
ENDOCERVICITIS: Chronic, treatment with high frequency current, 171
Actual cautery in [Baker and Miles] 570—ab
ENERGIES: Rational uses of physical, in otorhinolaryngology, [Hollender] 248
EPITHELIOMA: Study of microbic flora in cervical, [Vincent and Monad] 312—ab
ERYSIPELAS: In infancy and childhood, [Foote] 252—ab
Light treatment of chronic recurrent [Bohmer] 376—ab
Ultraviolet in, [Ude] 37—ab
EXERCISE: Systematic respiratory, for pleural adhesions [Klauber] 314—ab
EYE: Biomicroscopy in ophthalmic diagnosis, 595

Bucky's borderline rays in treatment of, [Krasso] 633—ab
Corneal ulcers, management of, 660
Light treatment of tuberculosis of [Hoffman] 573—ab
Phototherapy of, [Birch] 143—ab
Phototherapy in diseases of, [Guttman] 569—ab
Physico-dietetic treatment of glaucoma, [Heimann] 635—ab
Treatment in diseases of, [Brueckner] 509—ab
Treatment of cornea by ultraviolet, [Gasteiger] 255—ab
Treatment of vernal conjunctivitis [Riggins] 34—ab

F

FACE: Radium and surgery in cancer of, 536
FINGER: Screw traction in contractures of [Wolf] 253—ab
FRACTURE: Pathologic of mandible, [Field] 40—ab

G

GALVANISM: Indications for [von Thurzo] 440—ab
GASTRIC ULCER: Roentgenologic diagnosis of [Moore] 33—ab
GASTRO-ENTEROLOGY: Physical therapy in, 290
GASTRO-INTESTINAL: Physical therapy in disease, 165; [Strasser] 571—ab
GLAUCOMA: Physico-dietetic treatment of [Heimann] 635—ab
GONORRHEA: Heat treatment of, in female, 588
Treatment of complications of [Philipsen] 250—ab
GRAVE'S DISEASE: Modern treatment of, [Herzfeld] 376—ab
GYNECOLOGY: See also uterus
Deep seated heat in female pelvis, 410
Diathermy in [Kolischer] 570—ab
Physical therapy in, 145
Radiology as substitute for surgery [Heyman] 195—ab
Study of diathermy and ultraviolet in, 228

H

HAND: Low voltage currents in contractures of, 10
HAY FEVER: Physical therapy, adjunct in, 619
HEART: Bathing and drinking cures in failure of [Freund] 380—ab
Cardiospasm in new born infants, [Birnberg] 39—ab
Electrocardiography in study of diseases of [Marchbanks] 445—ab
Mechanotherapy of, [Kirchberg] 254—ab
Radiotherapy of disease of [Freund] 446—ab
Treatment of cardiovascular disease, [Schwig] 634—ab
Treatment of partial baths according to Hauffe [Genkin and Jassman] 382—ab
HELIOTHERAPY: See also ultraviolet, sunlight, phototherapy
Appreciation of [Klare] 694—ab
Changes on value of [Klare] 45—ab
In tuberculosis [Petter] 389—ab
HEMORRHOIDS: Medical diathermy in treatment of, 665
Seaside [Ceresole] 696—ab
HERNIA: Stomach [Ritvo] 142—ab
HIGH FREQUENCY CURRENT: See diathermy
In chronic endocervicitis, 171
HODGKIN'S DISEASE: In children [Corbeille] 36—ab
HOSPITAL: Managen ent of departments, 455
Modern physical therapy in practice, 7
Relation of physicians to department of, 460
HYPERTHERMIA: Artificial, by physical route [Weissmann] 444—ab
HYPERTONIA: Heart and circulation by [Jagic] 504—ab

I

INDUSTRIAL INJURIES: Physical therapy for, 327
Physical therapy in traumatic case, 179
INSULIN: Increased tolerance of pregnant rabbits for [Smith and Marks] 195—ab
IONIZATION: Chamber for measurements [Trelvar] 42—ab
For diseases of skin [Kaestenbaum] 314—ab
IRRADIATED: Bean roots, growth of [Wigoder and Patton] 42—ab
Yeast as means to increase quantity of vitamin content of mother's milk and cow's milk, [Wachtel] 140—ab
IRRADIATION: Changes by, in blood cholestrol in children [Leopold and Bernhard] 638—ab

K

KELOIDS: Treatment of [Eiger] 317—ab

L

LAMPS: Vitalux [Huldschinsky] 379—ab
LARYNGEAL TUBERCULOSIS: [Glenn-McGinnis] 195—ab
LIGHT: See ultraviolet, phototherapy, sunlight
Advantages and drawback of treatment [Günther] 441—ab
Calcium, pregnancy, and, [Guthmann and Schol] 252—ab
Dosage in therapy, [Anderson] 376—ab
Pathological action of [Levy] 638—ab
Specificity of action, in tuberculosis, [Phelps] 639—ab
Studies in modern treatment of [Cramer] 384—ab
LOW VOLTAGE CURRENTS: In contractures of hand, 10
Indications and technic, 237
LUMBAGO: See also rheumatism
Treatment of [Goldscheider] 317—ab
LYMPHOID: Electrosurgery for recurrent tissue after tonsillectomy, 600

M

MALIGNANT GROWTHS: See tumors, cancer, neoplasms
MALPRACTICE: In treatment by light and diathermy [Laquer] 315—ab

MAMMARY GLAND: Radiotherapy of, [Penzio] 251—ab
MASSAGE: Importance of, for science and general practitioner [Mueller] 312—ab
MELANOSARCOMA: Treatment of [Holfelder] 445—ab
MECHANOTHERAPY: In diseases of heart and vessels, [Kirchberg] 254—ab
METABOLISM: Climatological and balneologic treatment of [Strauss] 249—ab

N

NEOPLASMS: See also cancer, tumors
X-ray treatment of superficial, 432
Surgical diathermy in accessible, about head, 205
Superficial, x-ray treatment of, [Pennington] 142—ab
NERVE: Peripheral injuries of, [Abbot] 507—ab
NERVOUS DISEASES: Electrotherapy of [Tobias] 693
NERVOUS SYSTEM: Treatment of inflammatory diseases of peripheral [Schacherl] 695—ab
NEUROSES: Physical treatment of [Stein] 502

O

OBESITY: Studies in problems of, 418
OPHTHALMOLOGIC: See also eye
Biomicroscopy in diagnosis, 595
ORTHOPEDICS: Physical therapy in practice of, 583
OSTEOMALACIA: Study of, [Pilley] 43—ab [Wilson] 44—ab
OSTEOMYELITIS: Of flat bones — three successful cases, 131
OTITIS MEDIA: Treatment in infants, [Rumpf] 31—ab
OTOLARYNGOLOGY: Electrotherapeutics as applied to, 110
Physical and electrotherapy in, 113
Rational uses of physical energies in, [Hollender] 248—ab

P

PELVIS — FEMALE: Deep seated heat in, 410
Radiology as substitute for surgery [Heyman] 195—ab
PEPTIC ULCER: Mimicry of symptoms of [Hanley] 34—ab
New irradiation treatment of, [Kolta and Dunay] 45—ab
PERIDONTAL: Ultraviolet light in disease, 212
PHOTO-ELECTROMETER: [Sheard and Sanford] 38—ab
PHOTOTHERAPY: See also light, ultraviolet, sunlight
Of eye, [Birch] 143—ab
PHYSICAL ENERGIES: Rational uses of in oto-rhinolaryngology, 248—ab
PHYSICAL EXERCISE: Menstruation and [Dünter] 443—ab
PHYSICAL THERAPY: Adjunct in atrophic rhinitis, 225
Adjunct in hay fever and asthma, 619
Developments in science and practice [Tobias] 442—ab
In gastro-intestinal diseases [Strasser] 571—ab
In ear, nose, throat practice, 602
In gastro-intestinal disease, 165
In relation to surgery, 476
Of results of septic dissemination, 340
Rational teaching methods in, 455
Use in traumatic cases, 179
PITUITARY: Effect of roentgen ray irradiation on gland in menopause [Steinhard] 250—ab
Role of Roentgen ray and surgery in tumors [Towne] 141—ab
PNEUMONIA: Diathermy in, 150, 155
PNEUMOTHORAX: Electrosurgery of closed intrapleural pneumolysis in artificial [Matson] 252—ab
POSTOPERATIVE: Cathartic measures [Orator] 694—ab
POLYARTHRITIS: Therapy of [Schmidt and Weisz] 694—ab
PREGNANCY: Light and calcium in [Guthmann and Schol] 252—ab
PROJECTILE VOMITING: Relief of, in infants by radiation of upper chest region, [Barbour and Connell] 139—ab
PROSTATE: High voltage, x-ray of [Smith] 382—ab
Mesothorium treatment of [Hutter] 45—ab
PSORIASIS: Multiple x-ray cancers following, 209
PSORIATICS: In radioactive health resorts [Fabry] 318—ab
PUNCH: Bladder neck, with coagulation electrode [Day] 445—ab
Operation [Boyd] 34—ab
PSYCHIATRIC AND NEUROLOGICAL DISEASES: Further experiences with Roentgenotherapy in [Wiener] 252—ab
PYRETOTHERAPY: Substitute for experimental [Kahler and Knollmeyer] 510—ab

R

RADIANT ENERGY: As applied to skin lesions, 123
Experiments on, as lethal agent [Harvey] 39—ab
RADIATION: Comparison of effectiveness of, between mercury vapor and quartz lamp, 484
RADIOACTIVE SUBSTANCES: Biological action of secondary Beta, 254—ab
Treatment of malignant neoplasms with, 47
RADIOLOGICAL: Treatment of malignant tumors [Berven] 319—ab
RADIOLOGY: As substitute for surgery in cancer of female pelvic organs [Hayman] 195—ab
Of the thorax, [Brown] 37—ab
Value in diagnosis of peptic ulcer, 36
RADIOSENSITIVITY: Of cancer of cervix [Healey] 32—ab
RADIOTHERAPY: British for cancer, 28
In uterine hemorrhage [Danforth] 142—ab
Indications for, in uterine hemorrhage [Schmitz] 37—ab
Of bronchial asthma [Huet and Sobel] 568—ab

Of mammary gland [Penzio] 251—ab
Results of, in myomata and metropathies in years 1922-1927, [Geitner] 248—ab
RADIUM: Accuracy in dosage measurement, 470
Action of, on formation of blood capillaries and connective tissue, [Takahashi] 637—ab
American, 29
As a therapeutic agent, 333
Causes of death from [Larkin] 638—ab
Combined with surgery in face cancer, 536
Fibroids, use of in, [Neill] 36
In postoperative treatment of polypoid sinusitis, 14
Relation of dosage to age in production of amenorrhea [Asherson] 312—ab
Sequela after treatment [Asherton] 380—ab
Therapeutic results due to rays in plastic induration of penis [Fuhs] 318—ab
Treatment of blood diseases [Arzt] 510—ab
Treatment in diseases of blood [Jagic and Spengler] 504—ab
Treatment of diseases with subcutaneous or mucous membrane hemorrhages [Hoffman] 195—ab
Treatment of menorrhagia [Stacy and Mussey] 41—ab
Treatment of pregnant rabbits with giving increased tolerance for insulin [Smith and Marks] 195—ab
Treatment of primary carcinoma of breast [Keynes] 314—ab
Treatment of skin cancer [Williams] 37—ab
Treatment of uterine cervical cancer, 519
Treatment of vernal conjunctivitis [Riggins] 34—ab
Use in malignant diseases of upper air and food passages [Wright] 250—ab
RAYS: Effect of borderline on the skin [Herxheimer and Uhlmann] 255—ab
RECTAL ANESTHESIA: [Spiegel] 142—ab
RECTUM: Electrodes for stenoses of [Dinkin] 379—ab
Treatment of malignant tumors of [Bowing and Fricke] 31—ab
RED RAYS: Experiences with intense irradiations of [Cramer and Fechner] 44—ab
Experimental diseases produced by x-rays [Bolliger and Earlam] 382—ab
RENAL: Roentgen ray shadow of papilloma resembling calculus [Delzell] 140—ab
RHEUMATISM: Infra-red rays in [van Breeman] 506—ab
Irritation therapy of [Zimmer] 249—ab
Malaria [Lichtenstein] 443—ab
Management of [Jagic] 316—ab
Treatment of, in winter, [Fox] 506—ab
Treatment of muscular, in old people, [Krueger] 633—ab
Treatment by radium and thorium [Dausset] 379—ab
RHINITIS: Atrophic, physical therapy as adjunct in treatment of, 225
RICKETS: Amount of radiation for cure of, [Maughen and Dye] 640—ab
Irradiated milk in [Mouriquand, Leulier and Schoen] 505—ab
Recent acquisitions concerning, and their treatment, [Wieland] 443—ab
ROENTGEN: Compression technic in gastroduodenal diagnosis [Boman] 138—ab
Dextrocid treatment of malignant growths [Hirsch] 317—ab
Therapy of lymphogranulomatosis [Kruchen] 638—ab
Therapy of psychiatric and neurological diseases [Wiener] 252—ab
Therapy, status of, 185
Therapy, tuberculosis of tongue, 253—ab
ROENTGENOGRAM: Interpretation of chest in children, [Bigler] 39—ab
Of chest of non-tuberculous children suspected of being tuberculous, [Wolff and Stone] 139—ab
ROENTGENOLOGICAL: Lesions of male germinative cell and offspring [Loeffler] 313—ab
ROENTGEN RADIATION: Relief of projectile vomiting in infants by [Barbour and Connell] 139—ab
ROENTGEN RAY: And ulcer of lesser curvature [Talia] 569—ab
Contribution to treatment by, of chronic diseases of eye [Jendralski] 636—ab
Diagnosis of infantile scurvy [Bromer] 506—ab
Diagnosis in tuberculosis [Johanneson] 41—ab
Effect on chemical compounds [Stenstrom] 32—ab
Generalized irradiation in skin diseases [Fuhs] 376—ab
Irradiation in bronchial asthma [Zipperlen] 441—ab
Irradiation in diseases of lymph nodes in childhood [Lorenz] 447—ab
Irradiation of pituitary gland in menopause [Steinhard] 250—ab
Irradiation of prostate in urine retention, [Schiller and Altschul] 440—ab
Irradiation of postoperative cerebrospinal fluid fistulas [Schonbauer] 47—ab
Irradiation of tabetic conditions [Ahrengsmann and Illig] 695—ab
Lesions following depilatory irradiation [Hoede] 634—ab
Method of treatment of exophthalmic goitre [Jugenburg] 504—ab
Shadow resembling renal calculus caused by papilloma of the skin [Delzell] 140—ab
Treatment of acute inflammation of middle ear spaces [Goldman] 45—ab
Treatment of blepharitides [Lusza] 508—ab
Treatment of carbuncles [Light and Sosman] 637—ab
Treatment of climacteric disturbances [Borak] 46—ab
Treatment of gastric ulcer and chronic gastritis [Jenner] 510—ab
Treatment of Grave's disease [Rahn] 44—ab
Treatment of inflammatory processes [Pietro] 570—ab

Treatment of neurologic affections [v. Wieser] 570—ab
Treatment of ovarian dysfunction, 383—ab
Treatment of Paget's disease of nipple, [Muende] 639—ab
Treatment of pende-boil [Karlin] 316—ab
Treatment of superficial inflammations [Otto] 440—ab
Treatment of Waldeyer's ring in children [Schoenfeld and Baumbach] 693—ab
Treatment in Vaquez's disease [Milani] 34—ab
RUGAE GASTRICAE: [Galob] 35—ab

S

SCIATICA: Antipyrin injections and galvanization in, [Grinbarg] 381—ab
Meaning of [Jansen] 633—ab
Symptomatic [Hiller] 376—ab
Treatment of [Gerome] 44—ab
SCLERODERMA: [Edeiken] 35—ab
SILVER: Ionized, in treatment of burns [Shillito] 249—ab
SINUS: Accessory disease in children [Vaile] 249—ab
Incidence of disease in asthmatic children [Chobot] 140—ab
Radium in polypoid disease, 14
Radium in postoperative treatment, 14
SODIUM - ISO - AMYL - ETHYL - BARBITURATE: [McCallum and Zerfas] 140—ab
SKIN: Borderline rays in diseases of [Gertz] 319—ab
Carcinoma of, [Stuempke] 572—ab
Changes in, by x-rays and lipoid solvents, [Jarstad and Lane] 35—ab
Iontophoresis for treating diseases of [Gertz] 319—ab
Light treatment of tuberculosis of [Reyn] 571—ab
Massage of, [Memmesheimer] 446—ab
Physical therapeutics of diseases of, [Fuhs] 568—ab
Radiant energy applied to lesions, 123
Tissue reaction in chronic ulceration of, 16
Ultraviolet and high frequency therapy in diseases of [Heller] 381—ab
SMALL POX: Finsen treatment of, [Würtzen] 636—ab
SPINAL CORD: Influence of heating of, on hyper and dysidrosis of the hands [von Leszcynski] 441—ab
STERILITY: Treatment of female [Eymer] 383—ab
SUN BATHS: Influence of, on blood sugar curve at high altitudes [Basel] 140—ab
SUN CURE: For tuberculous children, 222
SUNLIGHT: Cauterization with, [Schoenberger] 46—ab
Oils and carbohydrates exposed to [Chakrabarti] 43—ab
Treatment of oral cavity and pharynx by artificial, [Hensler] 635—ab
Treatment of tuberculous peritonitis [Bernhard] 383—ab
Type S-1 lamp therapy in human rickets and spasmophilia, [Gerstenberger and Russell] 255—ab
SURGERY: Physical therapy in relation to, 476
Relations between balneology, climatology, and, [Weber] 444—ab

T

TEACHING: Rational methods of, physical therapy, 460
TEETH: And trigeminal neuralgia [Melchior] 40—ab
Fractured roots of [Feldman] 40—ab
Ultraviolet in peridontal disease, 212
TESTICLE: Diathermy of, and epididymis [Kowarschik] 574—ab
TETANY: Parathyroid, viosterol, in treatment of [Brougher] 138—ab
THALASSOTHERAPY: Problems of [Haberlin] 635—ab
THERMO - ELECTROCOAGULATION: Treatment of cancer of penis by, [Corbus] 253—ab
THYROID: Treatment of toxic [Clement] 31—ab
Treatment of with waves of short wave length [Clement] 142—ab
Roentgen diagnosis and therapy of disease of [Remmer and Belden] 195—ab
TISSUES: Resistance of, for electric currents, 391
TONICISER: Curative adjunct in surgery [Siegel] 47—ab
TONSILLECTOMY: Diathermy for, using surface anesthesia [Collins] 639—ab
Electrosurgery in recurrent lymphoid tissue after, 600
High frequency currents for [Zubak] 640—ab
Method of choice in, 1
TRACTION TREATMENT: Of finger contractions, [Wolf] 253—ab
TRAUMATIC CASES: Use of physical therapy in, 179
TRIBROMETHYLALCOHOL — (AVERTIN) Anesthesia in electrosurgery of head and neck, 120
TUBERCULOSIS: Advances in radiation treatment of [Bacmeister] 447—ab
Bone and joint, carbon arc treatment in [Pardee] 640—ab
Cutaneous — treatment of in Marburg clinic [Ruete] 636—ab
Diagnosis of the tracheo-bronchial glands, [Armand — Dellile and Lestocquoy] 39—ab
Heliotherapy in [Petter] 289—ab
In children [Webb] 295—ab
Of the tongue, Roentgen ray therapy for [Eghiayan] 253—ab
Laryngeal [Glenn and McGinnis] 195—ab
Pulmonary, non-apical infiltration of [Fischel] 33—ab
Renal, ultraviolet radiation and medical care *versus* surgery in treatment of, 222
Roentgen ray diagnosis in [Johanneson] 41—ab
Roentgenograms of suspects [Wolff and Stone] 138—ab
Saline bath in [Bretschneider] 508—ab
Sun cure for, 217

Specificity of light action in, [Phelps] 639—ab
Treatment of abdominal in females [von Jaschke] 313—ab
Viosterol for open pulmonary [Menschel] 639—ab
TUMORS: Breast, removal of, 365
Electrocoagulation of bladder, [Kolischer] 46—ab
Operation of malignant, [von Seemen] 696—ab

U

ULCER: Mimicry of symptoms of peptic, [Hanley] 34—ab
New irradiation treatment of peptic, [Kolta and Dunay] 45—ab
Roentgen diagnosis of gastric, [Moore] 33—ab
Varicose of leg [Fuh] 574—ab
ULTRAVIOLET: Adjuvant in treatment of biliary calculi, [Lorand] 252—ab
Amount of radiation for cure of rickets, [Maughan and Dye] 640—ab
Application of (Alpine sun) [Kowarschik] 314—ab
Changes in blood of new born by therapy, 101
Detoxification of nicotine by rays of, [Pacini and McGuigan] 383—ab
Factors determining dosage, 532
In management of corneal ulcers, 660
In peridontal diseases, 212
Intensive treatment of ischalgia, [Weiss] 574—ab
Irradiation in extrapulmonary tuberculosis, 286
Irradiation during lactation, [Bunbury] 378—ab
Irradiation of school children, [Colebrook] 32—ab
Medical care *versus* surgery in renal tuberculosis, 222
New source of, [Kraus] 446—ab
Pathologic effects on eye and treatment [Lear] 40—ab
Prophylaxis, 686
Stimulating action of rays on development of defense powers against tuberculosis in children, 140—ab
The magic, 482
Therapy in carbon monoxide poisoning, [Coza] 442—ab
Therapy in erysipelas, [Ude] 37—ab
Transmission of Philippine window shell [Fleming] 509—ab
Treatment of alopecia areata, [Narducci] 505—ab
Treatment of diseases of cornea, [Gasteiger] 255—ab
Treatment of gangrenous forms of mastitis by, [Kustner] 315—ab
Treatment of gastric ulcer by [Plaschkes] 447—ab
URINE: Incontinence in women, [Picard] 574—ab
UROLOGY: Physical therapeutic methods in, 493
URTICARIA: Colonic therapy in, [Scherber] 572—ab
UTERUS: Actual cautery in endocervicitis [Baker and Miles] 570—ab
Adenocarcinoma of, [Meigs] 35
Cautery surgery of, 36
Coagulation in cervicitis [Ende] 32—ab
Fibroids of, [Lindenberg] 34—ab
Radium *vs.* surgery in cervical cancer of, 519
Study of microbic flora in cervical epithelioma [Vincent and Monad] 312—ab
Treatment of endocervicitis, 171
Use of radium in fibroids, [Neill] 36
Treatment of menorrhagia [Stacy and Mussey] 41—ab

V

VESICULITIS: Treatment of, 162
VIOSTEROL (IRRADIATED ERGOSTEROL): Antirachitic action of, [Moore, Dennis and Phillips] 251—ab
In radiation sickness, [Smith] 305—ab
Mode of action of, 35
Of parathyroid tetany, [Brougher] 138—ab
Prophylactic and therapeutic dosage of, [Hess, Poucher, Dale, Klein] 505—ab
Studies on effect of, in large doses, [Borghi] 507—ab
Therapeutics of, [Hess, Lewis and Rivkin] 384—ab

W

WOUNDS: After treatment of, [Wette] 248—ab
Luminous and infra-red rays in [Biancini] 47—ab
X-ray treatment of fresh, [Freund] 572—ab

X

X-RAY: Accuracy in measurement of doses, 470
Criticism on irradiation of Grave's disease [Rieder] 636—ab
Dosage, biological laws and treatment methods, 19
Effect of, on nodules of Verruga peruana, [Muller and Tyler] 41—ab
Examination in pulmonary tuberculosis, [Rigler] 38—ab
Gall bladder in, [Brockmann and Schenck] 443—ab
High voltage, in carcinoma of prostate, [Smith] 382—ab
Ionization chamber for measurements, [Treloar] 42—ab
Irradiation of adnexa, [J. S. and K. Mayer] 313—ab
Management of tonsillar tumors, [Christifordis] 46—ab
Multiple cancers following psoriasis, 209
Nonoperative exclusion of kidney by treatment to heal ureteral fistulae, [Conrad] 378—ab
Pastille dose in Roentgen units, [Kaye and Binks] 42—ab
Sickness following deep therapy, [Schneider] 569—ab
Studies in intensity measurements, [Mayneord] 42—ab
Study of osteomalacia, [Pilley] 43—ab
Therapy, deep, [Thrash and Baker] 140—ab
Therapy, in glomerulo-nephritis, [Salvioli] 637—ab

Treatment of cancer of uterine cervix, 649
Treatment of superficial neoplasms, [Pennington] 142—ab
Treatment of wounds, [Freund] 637—ab

Y

YEAST: Irradiated, means to increase vitamin content of mother's milk and cow's milk, [Wachtel] 140—ab

AUTHOR INDEX

In this Index are the names of authors of articles which have appeared in full in the *Archives*.

A

Anderson, Wm. T., 482
Angus, T. C., 484

B

Bachem, A., 19, 391, 686
Bass, H. H., 347
Behan, R. J., 476
Berghausen, B. A., 16
Boot, G. W., 205
Bowman, P. G., 138
Broeman, C. J., 333
Broudo, Philip H., 185

C

Castroviejo, Ramon, 595
Caulk, John R., 492
Clark, Wm. L., 97
Crance, Albert M., 222
Crile, George W., 54

D

Denman, Ira O., 602

E

Ellison, R. T., 217
Engelman, W., 131
Evans, Archibald P., 331
Ewerhardt, F. H., 410

F

Fischer, H. G., 604
Freeland, F. B., 150

G

Goldberg, Benjamin, 263
Gellhorn, George, 654
Goodman, Herman, 209
Gries, Louis, 10, 237
Guttman, Joseph R., 120
Guttman, M. Reese, 120

H

Hays, Harold, 113
Hibben, J. Severy, 464
Highman, Walter J., 123
Hollender, A. R., 600
Hyams, Mortimer N., 171, 588

J

Jorstad, Louis H., 538

K

Kaplan, B. S., 18
Kern, Maximilian, 418
Kime, Edwin N., 343
Kobak, Disraeli, 286, 460, 665

L

Levinthal, Daniel H., 583
Levy, Louis H., 165
Lilien, A. A., 155

M

Morse, Frederick H., 340

N

Nugent, O. B., 660

P

Pennington, W. E., 432
Portman, U. V., 470
Price, Charles W., 209
Pugh, Winfield Scott, 155

R

Rasmussen, A. T., 217
Rebhorn, E. H., 179
Rothman, Harry W., 668
Robinson, G. Allen, 14
Roblee, M. A., 410, 607
Rowland, Amy F., 541
Royston, G. D., 418

S

Sanders, John T., 228
Sanford, Heyworth, N., 101
Schellberg, O. Boto, 668
Sellers, Thomas B., 228
Seybold, N. J., 199
Shea, John J., 110
Sputh, Carl B., 225, 619
Stenstrom, Wilhelm, 395
Strauss, Abraham, 536
Swanberg, Harold, 519

T

Telkes, Marie, 541
Thomson, James E. M., 327
Titus, Norman E., 7, 24, 674
Tyler, A. F., 649

V

Voyles, C. F., 290

W

Waddington, J. E. G.
Wahrer, F. L., 1
Warnshuis, G. J., 532
Willmoth, A. David, 365

Z

Zener, F. B., 410